The American

GAS LIGHT JOURNAL.

(ILLUSTRATED.)

DEVOTED TO THE INTERESTS OF

ILLUMINATION, HEATING, MECHANICAL, CHEMICAL

—AND—

GENERAL SCIENCE.

VOLUME XCVI.

(FIFTY-THIRD YEAR.)

FROM JANUARY 1 TO JUNE 30, 1912.

A. M. CALLENDER & CO., Publishers.

OFFICE OF PUBLICATION, NO. 42 PINE STREET, NEW YORK CITY.

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THE AMERICAN GAS LIGHT JOURNAL

PUBLISHED WEEKLY, AT No. 42 PINE STREET.

VOLUME XCVI., No. 1.
Whole No. 1,908.

NEW YORK, MONDAY, JANUARY 1, 1912.

Subscription, $3 Per Year.
$4 Canada, $5 Foreign.

INDEX TO CONTENTS, PAGE 1. - - - - - - ADVERTISERS' INDEX, PAGE 22.

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91
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CONTENTS.

An Asterisk (*) Denotes an Illustrated Article.

New Plant for the North Shore Consolidated Gas Company..... 1
*Paper Bag Cookery, by Mr. Philmer Eves..... 1
Proceedings, Sixth Annual Meeting, American Gas Institute—Continued from Vol. XCV. Page 404..... 2
First Day, Afternoon Session—*Commercial Motor Delivery: Cost and Results (Third Part), by Mr. L. R. Dutton
*Insulation as a Means of Minimizing Electrolysis in Underground Pipes, by Dr. E. B. Rosa and Mr. Burton McCollum..... 5
Proceedings, Seventh Annual Convention, National Commercial Gas Association—Continued from Vol. XCV., Page 414..... 7
Third Day, Morning—Discussing the Gulbrandsen Paper on "Manufacturing Gas Mantles from Artificial Fibers—Changes in the Constitution and By-Laws—Report of Committee on President's Address—A Pluming Bee—Other Communications—Increased Efficiency in Scientific Office Accounting, by P. R. Jones.
OFFICIAL NOTICES—
Annual Meeting, Indiana Gas Association..... 8
Forty-Second Meeting, New England Association, Gas Engineers. 8
EDITORIALS—
Briefly Told..... 8
The Old Year and the New—Current Mention.
SPECIAL ENGLISH CORRESPONDENCE..... 12
What is Coal?—President Shadboldt Defends the Gas Profession—Public Lighting of the City of London.
MANAGEMENT AND COMMERCIAL METHODS..... 13
*Gas and Electric Earnings' Chart.
Recent Patent Issues..... 14
ITEMS OF INTEREST FROM VARIOUS LOCALITIES..... 14
Consolidation Proposed for Flemington, N. J.—Big Output, Syracuse, N. Y.—An Interesting Ruling, Massachusetts—Applying for Charters—Cheaper Gas for Utica, N. Y.—Something from Northumberland, Pa. New Office Quarters, Geneseo, Ills.—Personal—Special Election, Battle Creek, Mich.—Mr. Evans was Surprised—A Merry Time in Alpha Hall—The Old Colony Gas Company Promoters Make Good—Personal—More Land for the North Adams (Mass.) Co.—An Unpaid Gas Bill a Lien on Property, Richmond, Va.—Something about the Connecticut River Transmission Company—Death of Mr. J. F. Shanley—Waking-up in Salt Lake City—And Other Items.
The Market for Gas Securities..... 16
Meeting Times of the Various Gas Associations..... 16
Public Lighting Table for January, 1912 (Advertising Section).... 27

New Plant for the North Shore Consolidated Gas Company.

The North Shore Consolidated Gas Company, of Waukegan, Ills., has contracted with the Semet-Solvay Company for a plant of gas ovens, to have a capacity of somewhat more than 1,000,000 cubic feet of gas per day. The North Shore Company supplies the town of Waukegan, and also the territory south thereof, down to Winnetka, a distance of about 25 miles. All of this territory, except Waukegan, is supplied by high pressure lines, through which the gas is pumped at an initial pressure of approximately 25 pounds. This high pressure service is controlled by pressure control valves at the meters of the consumers.

The new plant is being built on a piece of property recently acquired by the gas company, a short distance north of its present plant, and very conveniently located as to railroad service. The site is amply large to provide for any reasonable increase in plant required by the rapidly growing business of the Company.

The plant consists of 13 ovens of the Semet-Solvay gas-oven type. The Semet-Solvay Company has been developing for a number of years the manufacture of illuminating gas from its ovens, and the experience gained in the production and sale of over 20,000,000 feet daily from its several plants throughout the country has been applied to its gas oven in connection with the several features of this system which seem to be especially applicable to the manufacture of illuminating gas.

This plant will be of special interest to gas engineers, from the fact that it will probably be the first installation in this country of a straight gas oven plant, to deliver for sale the full amount of gas produced. The ovens are to be fired with producers employing the Doherty system of utilizing flue gas in the control of the fuel bed temperatures, which system has worked out very successfully in its application to gas oven practice. In this plant each oven has its own producer. Under the existing conditions, this arrangement was selected as preferable to an isolated producer plant supplying gas for all the ovens. The air is preheated by the heat in the waste gases from the oven flues in a simple, but effective, form of recuperator arranged below the oven, and the small volume of heat remaining in the flue gases is recovered in waste heat boilers so thoroughly that induced draft fans are required to produce the necessary draft for burning the gas.

The coal is to be delivered from the railroad cars into the coal hopper, going thence to the crushing and pulverizing mills, and on to the coal bins above the oven. All of the coal will be pulverised to about ¼-inch size, or smaller. The work of the Semet-Solvay Company, on coals from a large number of points in the United States in the production of high grade metallurgical coke, has shown that this fine pulverising is of material help in the production of coke of uniform composition and cell structure. The ovens will have a capacity of about 9 tons each, and will be charged through the usual charging holes in the roof, by an electrically operated charging car. When ready, the coke will be discharged from the ovens by the usual coke oven type of pusher, into the "quenching car," which is well-known in the Semet-Solvay installations, and there the coke is quenched by the application of a large stream of water. This method of quenching produces a dryer coke than any other method that has been developed commercially. The coke as produced will be crushed, screened and delivered to a storage bin ready for shipment.

The foul main will deliver the gas to the condenser house, which is a brick and steel building, 48 feet by 64 feet, the side bays are 16 feet high and the middle bay 34 feet. This building is to contain the condensing and scrubbing apparatus, which is of the Doherty washer-cooler type. Descriptions of this apparatus as applied to coke oven operation have already appeared in the journals. The ammonia Distillation apparatus occupies one end of the building. Other parts are occupied by the exhausters, pumps, machine shop, etc., thus making a very compact installation conducive to efficiency of operation and low labor cost. It is proposed to have the plant ready for operation early next summer.

Paper Bag Cookery.

[Prepared for the JOURNAL by MR. PHILMER EVES, Indianapolis, Ind.]

When Hon. John L. Griffiths, United States Consul-General to London, reported upon the phenomenal success obtained by Nicholas Soyer in cooking in paper bags in the metropolis of England, and when it was found that the same method had been popular in Germany for some five years, it was considered somewhat surprising that the American people had up to that time known comparatively little upon the subject.

The paper bag factories, however, soon got busy, and the newspapers in almost every city and town in the country devoted columns of space and editorials on the subject, so that, in the short time o two months, paper bag cookery passed from the stages of a "novelty and a "fad" to an established system of cooking economy.

Indianapolis was among the first to take this matter up in earnest, a movement partly traceable to the fact that Indianapolis is the home of the Consul who had early put the American people "wise" to this ad-

vanced system of preparing foods, and of saving time and fuel. The Indianapolis Gas Company has established an elaborate "Model Kitchen," which is thoroughly equipped with every facility for carrying on public demonstrations of cooking in the paper bags. The interest created has been gratifying to the Company, and has brought considerable good will and gratitude from all classes of gas consumers.

When the public demonstrations had been well advanced, and the demonstrators had become thoroughly proficient in the use of the paper bags, the Company went a step further and invited the Domestic Science teachers of the public schools of the city to escort their cooking classes to the office of the Company for a course of instruction in paper bag possibilities. Practically all the school classes have now received the lessons. The "Model Kitchen" was inadequate to receive these large classes of 40 or 50 school children each, so a larger kitchen in the salesmen's room had to be utilized for the purpose. So successful have the meetings proved that the cooking schools are now adopting the paper bags. The teachers are finding that not only are the pupils interested, but that their parents are using the paper bags for cooking meats, fish, vegetables, fruits, etc., that were formerly prepared in the open ovens.

The illustration published herewith, shows one of these school

classes at one of The Indianapolis Gas Company's demonstrations. The idea of interesting the schools in the paper bags is a suggestion that may prove valuable to all gas companies.

[Continued from Vol. XCV., Page 404.]

PROCEEDINGS, SIXTH ANNUAL MEETING, AMERICAN GAS INSTITUTE.

Held in St. Louis, Mo., October 18 to 20, 1911.

First Day—Afternoon Session.

COMMERCIAL MOTOR DELIVERY: COST AND RESULTS.[1]—*Continued.*

Electric Trucks.—One company reporting 5 one-ton trucks (all of one make) 1½ years old, one ½-ton truck, and one 2-ton trucks, in use only a few months, furnishes the following operating costs. Total mileage of the 7 cars, 39,507:

Operating Expense.

Cost.	Total.	Per Mile.
Battery man	1,100.00	0.028
Battery maintenance	595.71	0 015
Chains and sprockets	146.58	0.004
Chassis repairs	54.09	0.001
Current	282.38	0.007
Generating plant	133.21	0.003
Tires	591.06	0.015
Wagon repairs	17.00	0.000
Wagon washing	587.83	0.015
Miscellaneous	387.01	0.010
	3,894.87	0.098
Insurance	539.90	0.014
Battery maintenance accrued	984.57	0.025
Tires depreciation accrued	199.08	0.005
Depreciation at 10 per cent.	2,054.00	0.052
Interest at 8 per cent.	1,739.40	0.044
Total cost	9,411.82	0.238

The following figures are given on a 2 ton electric truck covering 2 years service.

	Total Cost.	Co t per Mile.
Current at 2½ cents per k-w	253.88	0.0275
Labor for maintenance	486.78	0.0528
Maintenance and repairs	1,130.04	0 1225
Total expense	1,870.70	0.2028

Miles travelled, 9,225.

This truck is reported out of service for maintenance in the 2 years 12½ per cent. of the working hours. The same company reports the following summary of expense on a 1,000-lb. electric truck, covering a period of 2½ years service - total mileage 10,274:

	Total Cost	Cost per M le.
Interest on $1,668 at 6 per cent.	$250.20	0.0244
10 per cent. depreciation on the value of the wagon	244.20	0.0237
Maintenance and depreciation of batteries	601.02	0 0586
Tires and repairs	210.00	0.0204
Wagon expense, repairs	145.12	0.0142
Miscellaneous charges	48.54	0.0047
Total expense	1,499.08	0.1460

It will be noted that the owner of this vehicle suggests different depreciation values on various parts of an electric machine. He divides it as follows: First, depreciation on wagon; second, depreciation on tires; third, depreciation on batteries.

These expenses are complete, because the expense is included up to the point where the truck has a new set of tires, and is in good condition except that the wagon needs painting. It also had a new battery installed during the past year. Valuable information on the operation of electric vehicles can be obtained by consulting the Report of the Committee on Electric Vehicles, National Electric Light Association, June, 1911.

Auto Trucks, Electric, Cost of Operating, 1,500 Pounds and 3,000 Pounds Capacity Delivery Wagons.

Fixed Charges and General Expense.	Average Cost Per Month.	Average Cost Total.	Per Mile, Cents.
Drivers' salary	$65.00	$5,687.50	9.0
Supervision	5.22	456.75	0.7
Garage rent	5.18	453.25	0.7
Wheel tax	2.67	233.62	0.4
Washing, oiling, etc	13.00	1,137.50	1.8
Interest at 5 per cent., taxes at 1.5 per cent., and insurance at .5 per cent. on total cost of wagon	14.58	1,275.65	2.0
Depreciation:			
Batteries, 66⅔ per year on $255	14.17	1,239.87	2.0
Tires, 100 per cent. per yr. on $225.60.	18.80	1,645.00	2.6
Balance of wagon, 10 per cent. per yr.	15.99	1,399.13	2.2
Total gen. ex. and fixed charges	$154.61	$13,528.27	21.4
Total supplies and repairs	29.44	2,575.44	4.0
Grand total expense	$184.05	$16,103.71	25.4

Operating Cost of Three 30-Horse Power Touring Cars of Well Known Make, Used by the Managers and Superintendents of More Companies Than any Other Make—Cost, Under $2,000.

	1st Car. 9,474 Miles. 2⅔ Yrs. Use.		2d Car. 11,600 Miles. 1⅔ Yrs. Use.		3d Car. 15,65[illegible] Miles. 2⅓ Yrs. Use.	
	Total Co-t.	Cost per Mile.	Total Cost.	Cost per Mile.	Total C st.	Cost per Mile.
Gasoline	109.66	0.012	106.75	0.0092	154.60	0.010
Oil, etc	6.28	0.001	20.85	0.0001	34.27	0.002
Tires	168.17	0.017	186.49	0.0161	243.48	0.016
Repairs	68.63	0.007	90.62	0.0078	76.43	0.005
	352.74	0.037	404.71	0.0332	508.78	0.033

Runabouts Used by Salesmen of a Gas Company.—One gas company reports the use by salesmen of 3 cars, costing $750 each. Being low priced, but covering only from 500 to 800 miles per month, the

1. Paper by Mr. L. R. Dutton, *ante*, p. 404.

Auto Trucks (Electric) Cost of Operating 1,500 Pounds and 3,000 Pounds Capacity Delivery Wagons, April Issue of "Data."

Month.	Rigs in Service.	Oil and Supplies.	General Repairs.	Energy Kw.-Hr. 4 c.	Total.	Maintenance: Tires.	Maintenance: Batteries.	Total Miles.	Av. Kw. Hr. per Mile.	Day Service per Wagon.	Av. M's per Day per Wa'n.
January, 1909	1	$10.75	.....	$13.68	$24.43	.....	.....	617	0.556	23.0	26.8
February, 1909	2	17.96	$2.10	23.92	43.98	.....	.....	1,197	0.500	24.0	24.9
March, 1909	3	15.26	.....	42.28	57.54	.....	.....	2.329	0.454	25.5	30.6
April, 1909	3	16.60	.....	35.56	52.16	.....	.....	2.073	0.429	26.0	26.6
May, 1909	3	.85	.....	37.76	38.61	.....	.....	2,215	0.426	25-0	29.5
June, 1909	3	2.00	.....	37.64	39.64	.....	.....	2,269	0.415	26.0	29.1
July, 1909	3½	39.46	.....	52.92	92.38	.....	.....	3,136	0.422	27.7	32.3
August, 1909	4½	13.90	3.21	61.48	78.59	$1.50	$74.90	3,660	0.420	25.8	31 8
September, 1909	5½	.50	7.59	70.60	78.69	1.50	Cr 17.06	4,175	0.423	23.5	32.4
October, 1909	6	3.50	13.24	85.16	101.90	3.25	16.70	5,080	0.419	26.2	32.4
November, 1909	6	49.80	28.39	85.96	164.15	207.25	39.74	5,094	0.422	24.8	34.2
December, 1909	6	15.20	7.08	68.80	91.08	.....	3.33	4,119	0.418	24.8	27.6
January, 1910	5	6.25	120.91	44.40	171.56	123.00	16.65	2,686	0.413	20.0	36.9
February, 1910	6	6.90	7.38	55.20	69.48	.....	.....	2,816	0.489	18.5	25.4
March, 1910	6	9.25	735.86	52.76	797.87	Cr 5.49	.....	3,449	0.404	18.8	31.4
April, 1910	6	18.40	51.50	61.96	131.86	.....	.....	3,964	0.410	21.7	30.5
May, 1910	6	18.43	75.17	71.20	164.80	.....	.....	4,441	0.401	24.0	30.8
June, 1910	6	22.08	103.29	81.48	206.85	64.00	.....	5,099	0,399	26.0	32.7
July, 1910	6	6.90	74.77	88.20	169.87	231.75	33.07	4,826	0.458	25.2	31.9
Total		$273.99	$1,230.49	$1,070.96	$2,575.44	$626.76	$167.33	63,245	0.426	23.7	30.5
Av. cost per month		3.83	14.07	12.24	29.44	7.16	1.91	723	.....	....	....
Av. cost per mile		.004c.	.019c.	.017c.	.04c.	.010c.	.003c.	.093	.....	...	....

depreciation was high. The amount charged for depreciation was the actual amount, because the cars were sold at the end of the year and the loss was known. The operating expense on the first car was 4.8 cents per mile; on the second, 10 cents per mile; on the third, 10½ cents per mile. If these cars were used by only one salesman it would indicate that the cost was unusually high. A well-known company in another line of business, having salesmen in various parts of the country, furnished 14 of its men with runabout cars costing $1,000 each. The cars averaged four months operation; mileage of car, 3,830. Items of expense: Gasoline, oil and grease, repairs to motor, derpeciation, 25 per cent. per annum. Total cost per mile 14.9 cents.

Gasoline Trucks 1,000 lbs. Capacity.—Cost of operating 5 1,000 lb. trucks of a well-known make, costing $750 each, with large wheels and solid tires;

	Mileage	Cost per mile
Truck No. 1	2,000	0.0926
Truck No. 2	9,210	0.042
Truck No. 3	8,160	0.045
Truck No. 4	3,565	0.045
Truck No. 5	3,924	0 045

The costs of the above trucks include gasoline, oil and grease, tire repairs and sundries. The average is very uniform, except with car No. 1, the additional expense originating from a broken motor caused by an inexperienced driver learning to operate. The different companies operating these trucks all state that the depreciation cost is very high. In most cases the truck can only be kept in use a few months or a year and traded in for a new one. At least 50 per cent. depreciation should be charged the first year. A practically similar experience was reported by a company with a truck of the same capacity and low cost, built by a different concern.

One Ton Trucks.—Three companies report on the use of 1-ton trucks of different makes. Company No. 1 reports on *two 1-ton* trucks; total mileage, 18,550; cost per mile, 10 cents. This includes gasoline, oil, tires, and motor repairs. The opinion of the owner is that the depreciation is 33⅓ per cent. per year.

Company No. 2, reports on *three*, 1-*ton* trucks. The report covers gasoline, oil, tires, and repairs. The owner estimates depreciation 15 per cent.

Truck No. 1, 6,060 miles; cost per mile, 0.11 cent., truck No. 2, 6,300 miles; cost per mile 0 10 6/12 cent; truck No. 3, 8,000 miles; cost per mile 0.08 6/10 cent.

Company No. 3 reports on the operation of one 1-ton truck, shown in Fig. 6.

Fig. 6.—One-Ton Trucks.

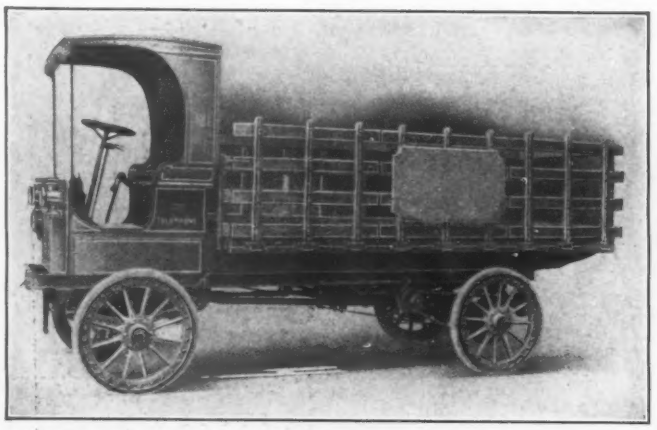


Fig. 7.—Two Ton Truck.

Fig. 8—Illustrating a 2-Ton Gasoline Truck Designed by a Well-known Gas Engineer.

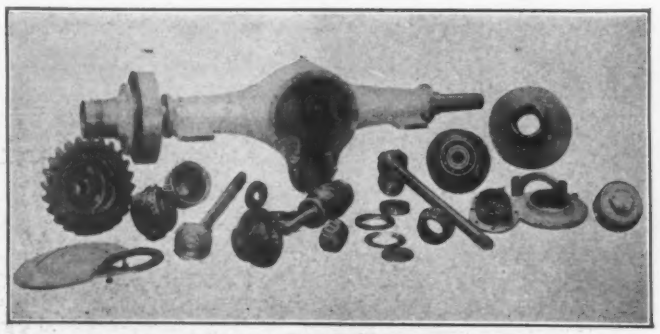


Fig. 9—Illustrating the rear construction of the worm-drive truck in Fig. 8. The worms and warm wheels are shown ready to be assembled.

The expenses on 2,600 miles are as follows:

	Total Cost.	Cost per Mile.
Gasoline, at 11 cents per gal.	$34.05	0.013
Oil at 50 cents per gallon	8.45	0.003
Tires (accrued).....	48.00	0.018
Repairs none.		
Total..	90.50	0.034

The item of tires mentioned above was owing to the rear tires being too light. They were removed and one inch heavier solid tires installed, at the above cost. The motor is of the 2-cycle type, the chassis being shown in Fig. 12. The air-cooling system of the engine is illustrated in Fig. 13. This car is further described by the writer in the latter part of this paper.

Fig. 10.—This novel motor truck has greatly increased the efficiency of the electric light cleaning force of Philadelphia. In a test run with the new truck one man cleaned and renewed the carbons in 165 lamps in 6 hours: quite a creditable performance. The truck can be driven either from below or from a seat on the tower, enabling one man to do the work of two.

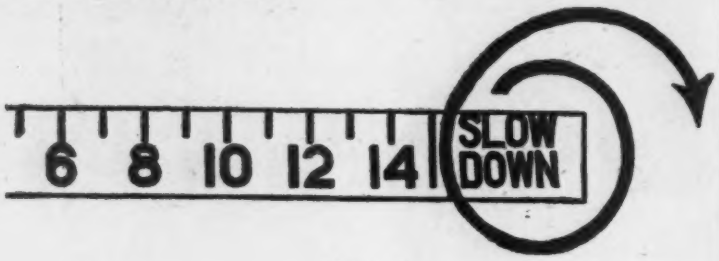


Fig 11.

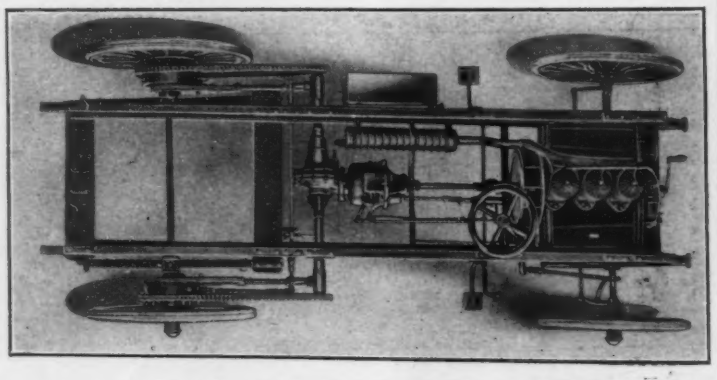


Fig. 12.—Chassis of 1-Ton Truck, 2-Cycle Motor.

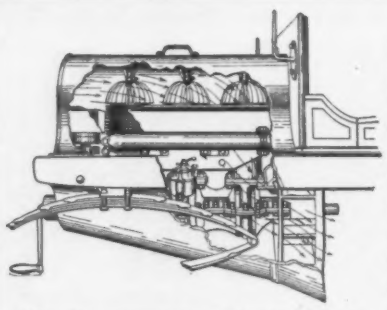


Fig. 13.—System of Air Cooling, 2-Cycle Motor.

1½-Ton Trucks.—The fact that hundreds of 1½-ton trucks are in use, and that 50 of one make were in a recent motor truck parade, in which 300 cars were entered, show that they are almost standard in that particular city. Yet only one company has reported on a truck of this capacity and similar make. The report covers a total of 11,160 miles and the truck was in use 14 months.

	Total Cost.	Cost per Mile.
Gasoline at 15 cents, 7 mil. per gal ...	236.70	0.0212
Oil at 35 cents per gal.....	35.00	0.0031
Tires and repairs	150.00	0.0134
Repairs and sundries	35.10	0.0031
Total expense...	456.80	0.0408

The owner believes 12½ per cent. depreciation should be charged on this truck. Its makers have reports from the owners of hundreds of these cars and claim the operating costs to average 8 cents per mile, made up as follows: Five per cent. interest on investment; depreciation, 25 per cent.; gasoline, oil, tires, motor repairs and maintenance, 70 per cent.

Cost of Operating 2-Ton Truck—From the reports received only 3 companies are using the same make. One of the three furnishes detailed costs of operation, which report is very complete. Truck was owned 14 months, or 352 working days; days in use, 227; days idle for repairs, 75, or 21 per cent.

The owner reports that, although this car has been on the market for several years, an unusual amount of time was lost because of poor service rendered by the manufacturer and agent, owing to delays in obtaining repair parts. When parts were received they either did not fit the machine or were not perfect. Time lost was due as follows, in days: To springs, 5; to tires and wheels, 13; to motor, 33; to transmission, 15; to radiator, 9. The mileage was 11,300; gallons gasoline used, 2,250, or 5 miles per gallon; miles traveled daily, 41.

A summary of the operating expense of this truck is shown as follows:

	Total Cost	Cost per Mile
Gasoline.....	$298.23	0.0265
Oil	100.41	0.0089
Tires and repairs	432.98	0 0384
Car repair and sundries.....	370.22	0.0328
Labor, cleaning, etc	514.27	0.0456
Total.....	1,716.00	0.1522
Standing Expense.		
Insurance	$68.29	0.006
Depreciation, 2 per cent., month	653.90	0.058
Total expenses.....	$2,438.30	0.21 6/10

It should be noted in connection with this truck that a common fault was found of installing tires under capacity on the rear wheels. The wheels also were too light for the load, owing to the overhang of pipe and poles from the rear of the truck. When the proper equipment was installed it was found that good service was received. The same difficulty was experienced with the springs, but they were changed to heavier type. It would appear that this make of truck would prove very satisfactory, after taking care of the usual difficulties experienced, by having it properly equipped for the work to be performed. The second year's operation should prove much more economical.

Ten 3-Ton Trucks.—Carefully compiled figures show that 3-ton trucks, covering 40 miles a day, and operating 300 days a year, can be maintained and run at an average cost of $9.75 per day. The items making up this charge for an establishment of 10 trucks, 3 tons capacity, are:

Wages, 10 drivers at $2.50..... ..	$25.00
Wages, repairmen, helper and washer.....	7.00
Gasoline, 80 gals. at 12 cents.....	9.60
Lubricant, 1 cent per mile	4.00
Maintenance, 10 per cent. per year.....	10.00
Superintendence	3.20
Incidentals, light, heat, tools, etc.....	2.87
	$61.67
Average running expense per truck.....	6.17
Interest at 6 per cent., depreciation at 20 per cent., insurance at ½ per cent., all on $3,000.....	2.65

Storage, 200 sq. ft. at 50 cents per year	0.33
Add 20 per cent. for 2 spare machines	0.60
Total operating and maintenance cost per day	$ 9.75
Total operating and maintenance cost per mile	0.24½

Tabulated cost of four 3-ton trucks, 4 years old, operating 40 miles per day in Chicago. Each truck saves $9 per day on horses formerly used.

Standing Expense.

	Per Day	Per Mile
5 per cent. interest on $3,500.00	$0.58	0.015
Insurance	0.28	0.007
Running Expense.		
Gasoline, 10 gals. at $0.11	1.10	0 027
Oil and grease	0.57	0.015
Tires and general repairs	2.00	0.050
Machine cleaning	1.31	0.32
Total	$5.84	0.14

Brewers have almost standardized one well-known make of truck of 3 tons capacity; sixty three brewers in 32 cities using the make.

Five-Ton Trucks.—Only two companies report on 5-ton trucks. These have both been in use a year and the exact cost has been ascertained. The trucks are manufactured by different concerns. The operating costs are shown as follows:

First 5-Ton Truck.

	Total Cost.	Cost per Mile.
Gasoline at 15 cents 0.033 mile per gallon	$300.00	$0.05
Oil at 35 cents per gallon	105.00	0.0175
Tires	260.00	0.0434
Maintenance and repairs	87.36	0.0145
Total expense	$752.36	$0.1254

Annual mileage 6,000 miles = per day 22 miles.

It is interesting to note that the owner of this truck states it has depreciated only 5 per cent., and that the truck performs the same work as a horse equipment costing $14.15 per day.

Second 5-Ton Truck.

	Total Cost.	Cost per Mile.
Gasoline 3 mile per gallon at 10 cents	$350.00	$0.034
Oil at 55 cents per gallon	140.00	0.013
Tires	798.00	0.076
Repairs and maintenance	1,400.00	0.133
Total expense	$2,688.00	$0.256

Annual mileage 10,500 miles = 35 miles per day.

It is interesting to note that the owner of this truck estimates 24 per cent. depreciation.

Summary of Cost of Various Size Trucks and Cost of Operation Reported by "Data."

Approximate Daily Cost of Motor Trucks,	10-Ton.	7-Ton,	5-Ton.	3-Ton,	2-Ton.	1-Ton.
Chassis cost	$6,000	$5,500	$5,000	$3,000	$2,750	$1,500
With stake body	6,300	5,775	5,250	3,225	2,925	1,700
Average miles per day	38	46	50	60	70	80
	Per Year.	Per Year.	Per Year.	Per Year.	Per Year.	Per Year
Depreciation 15 per cent. less cost one set tires	$780.00	$743.00	$695.00	$421.00	$390.00	$225.00
Interest 5 per cent.	315.00	289.00	262.00	161.00	146 00	85.00
Driver $16 to $22 per week	1,144.00	1,092.00	1,040.00	936.00	136.00	832.00
Garage	300.00	300.00	300.00	240.00	240.00	240.00
Tires	1,650.00	1,231.00	930.00	620.00	480 00	300.00
Yearly overhaul and current repairs	550.00	500.00	450.00	400.00	350.00	300.00
Gasoline, at 12 cents	450.00	450.00	450.00	375.00	325.00	275.00
Oil, at 30 cents	120.00	100.00	90.00	60.00	50.00	40 00
Insurance	220.00	210.00	200.00	150.00	140.00	125.00
Cost per year	$5,529.00	$4,915.00	$4,417.00	$3,363.00	$3,057.00	$2,422.00
Cost per day	18.43	16.38	14.72	11.21	10.19	8.67
Cost per mile	0.48½	0.35	0.30	0.20	0.15	0.10

The worm drive which has been adopted by builders of motor vehicles abroad is installed in this truck. Very little attention has been given to it by American builders, although the housing of the worm drive in the rear construction, its simple design, easy lubrication, and noiseless running, should favor its high efficiency and long life.

(To be Continued.)

MR. S. SMITH has formally assumed the duties of Manager to the Antigo (Wis.) Gas Company. Mr. Smith was formerly in the service of the Stone & Webster Company, resigning from such to identify himself with the Wallace-Fyfe syndicate of Detroit. He first served it as travelling representative, and later on was given charge of the Green Bay (Wis.) plant.

Insulation as a Means of Minimizing Electrolysis in Underground Pipes.

[Prepared for the Sixth Meeting, American Gas Institute, by DR. E. B. ROSA and MR. BURTON MCCOLLUM.]

The protection of gas and water pipes and other buried structures from damage by electric currents has long been one of the most important, and, at the same time, one of the most difficult problems with which the engineer has to contend. There are few problems that affect a greater diversity of interests, or which involve the welfare of greater amounts of property, than those arising from the presence of stray currents in the earth. The phenomenon of electrolysis of gas and water pipes by stray currents from electric railways has been the subject of a vast amount of study and experiment, and much information has been brought to light and a great deal of progress made in methods of minimizing trouble from this source. There remain, however, many problems on which further light must be thrown before remedial measures can be applied with that degree of certainty which modern engineering practice demands. Closely related to electrolysis from stray currents, and inseparable from it in any comprehensive investigation of the subject, are the phenomena of self-corrosion or auto-electrolysis, due to the presence of cinders, particles of coke and other substances which give a difference of potential against iron, or due to the physical condition of the pipe itself. The corrosion due to this cause is fundamentally a phenomenon of electrolysis and the resulting damage is often difficult, if not impossible, to distinguish from that due to stray currents from electric railways. During recent years, also, much attention has been drawn to the possibility of the destruction of reinforced concrete structures by stray currents, and considerable apprehension has been aroused lest reinforced concrete buildings, bridges, etc., might be damaged or destroyed by electrolysis. Whether or not such grave danger actually exists in practice, the possibility of such danger having been established, the problem becomes one of extreme importance, since not only are vast property interests concerned, but there exists also the possibility of serious hazard to human life. Further, any measures that may be taken to protect gas or water pipes from electrolysis will at the same time affect, in a greater or less degree, the possibility of danger to reinforced concrete structures, since the pipes usually enter such buildings and afford one of the principal means of entrance of stray currents into the reinforcement of the concrete. It is evident, therefore, that any comprehensive investigation into the subject of electrolysis must be considerably broader in its scope than those investigations usually undertaken with a view to protecting pipes alone. Recognizing the importance of the subject, and acting in response to requests from important engineering interests, the Bureau of Standards has undertaken an investigation with a view to throwing as much light as possible on the different phases of the problem and their relation to each other.

The work was begun July, 1910, and has since been carried on by laboratory investigations, by correspondence with engineers and corporations, and by investigations in the field under practical conditions. During the fall and winter of 1910, the work was confined largely to a study of the effects of electric currents on concrete, and of auto-electrolysis, but, in the early part of 1911, the work was extended to include laboratory and field work covering the general subject of electrolysis, special attention being given to methods of minimizing electrolysis. It is not to be expected that an investigation of this character and magnitude can be brought to a conclusion in a single season, and up to the present time only certain phases of the

problem have been investigated fully enough to justify even a progress report being made on them at this time. Much important work in connection with various methods of minimizing electrolysis remains yet to be done, and it is planned that this work shall continue as long as circumstances may require.

In taking up this problem it is not the intention of the Bureau to make investigations under local or exceptional conditions, with the view merely of remedying the evil in particular cases, nor to invade the field now occupied by the consulting engineer, but rather to confine ourselves to the broader and more general aspects of the problem, and to render as much aid as possible in bringing to light information and in establishing general principles which may be of service to the engineer in dealing with the infinite varieties of situations that present themselves in practice. Of the dozen or more methods that have been proposed or tried for minimizing electrolysis, there is none which will not, when properly carried out, result in greater or less reduction in the damage due to stray currents. On the other hand, there are few, if any, of these methods which will not, when wrongly applied, yield unsatisfactory results, either through failure to accomplish the results desired or by imposing unnecessary hardship on the parties interested. Vast sums have been spent in unsuccessful and ill-advised attempts to remedy the evil, and these errors could have been avoided if the persons in charge of the work had had a thorough knowledge of the difficulties confronting them. It is of first importance, therefore, in dealing with any situation where serious damage may occur, to place the work of mitigation in charge of a competent engineer. The farther our knowledge of the subject advances the more important this becomes, since only the specialist can be expected to acquire that broad knowledge of the subject and the maturity of judgment that are essential in securing the maximum of protection at a minimum cost.

In discussing the various remedies that have been proposed for reducing the damage to pipes, due to stray currents, the methods may be broadly grouped under 4 heads, viz.: (1) Those which have for their object the keeping of the currents off the pipes altogether or reducing them to a negligible quantity; (2) those which, while they do not tend to reduce the currents in the pipes, but rather to increase them, are designed to permit the currents to flow off in such a way that they can do little or no injury; (3) those which contemplate the use of alternating currents or periodically reversed currents in connection with railway systems; and (4), the use of chemicals, such as lime around the pipes, to prevent electrolytic action.

The first of these methods may again be subdivided into 4 groups, viz.: (1) Those methods which aim to eliminate earth currents entirely, as the double trolley system and its equivalents; (2) those which aim to reduce the difference of potential between different portions of the system, to so low a value that they will do no appreciable harm, as by the use of negative return feeders to rails, careful bonding, boosters, etc.; (3) those methods while they make no attempt to reduce potential differences in the earth, due to the railway currents, aim to locate the pipes where the potential gradients are too low to cause appreciable currents to flow in them; and (4), those which aim to protect the pipes by some method of insulation, or partial insulation, whereby the currents on the pipes are reduced to a negligible minimum. While investigations have been in progress for some time, tending to throw light on all of these various methods, and they will be treated in later reports, only the last one, viz., the method of insulation, will be dealt with in the present paper. In thus confining ourselves to the discussion of one general method of minimizing electrolysis, it is not to be understood that we regard this as necessarily the best method of preventing the trouble, but rather because our investigations relating to other methods have not yet been carried far enough to justify us in attempting to summarize the result. Further, our investigations relating to the method of insulation will be pushed further, and other and more complete papers will be published as the work proceeds.

When troubles from electrolysis first began to assume serious proportions, following the general introduction of trolley systems in cities, one of the first remedies to suggest itself was that of insulating the pipes. Numerous attempts were made at different places to protect pipes in this way, but in most cases the results were uncertain or unsatisfactory. Attempts were made to protect pipes by laying them in conduit, and in other cases by imbedding them in cement, but neither of these methods proved of material value. The reason for their failure is simply that such materials absorb moisture and, when wet, have considerable electrical conductivity, so that current can enter and leave a conduit inclosed or cement coated pipe almost as freely as one laid in earth. One company is now manufacturing a cement-coated, cement lined pipe which it claims has in a number of cases been subjected to quite severe conditions for years without any trouble from electrolysis, and this freedom from trouble has been attributed to the cement coating. In these cases, however, the pipes were laid with cement joints also, and there is every reason for believing that these have been responsible for the protection afforded the pipes. The company which manufactures these pipes has, however, had considerable trouble with the cement joints, due to mechanical imperfections, and has recently adopted the use of lead joints in connection with the cement coated pipes, and is installing them on the assumption that these will be as free from electrolysis as the older line with cement joints. In order to test the relative value of the two kinds of pipe lines and to determine, if possible, whether cement coated pipes with lead joints would be more affected by electrolysis than the same pipes laid with cement joints, the Bureau of Standards has laid in Washington, two parallel lines of such pipe 100 feet long and 20 feet apart, one using cement joints throughout and the other using lead joints throughout, and has kept them subjected for some months past to identical conditions as regards danger from electrolysis. The arrangement of the pipes is shown in Fig. 1. Near each line at either end, and about 2 feet from the pipes, was buried a single length of ordinary cast iron soil pipe and these were connected together in pairs as shown and used as terminals on which a difference of potential of about 15 volts was constantly maintained. At the middle of each line an insulating plate was inserted to separate the two halves electrically and two insulated leads were brought up from the ends adjacent to the place in which an ammeter could be inserted for the purpose of measuring the current flow in the pipes. The readings obtained from time-to-time are shown in Table I. It will be noted that the current in the line having lead joints is several hundred times greater than in the cement jointed line. On October 13, 1911, a portion of the pipes was uncovered near the positive end and examined, and it was found that, while the pipes provided with cement joints were still in practically as good a state of preservation as when first laid, the line having lead joints showed marked evidence of corrosion, the outer metal sheath protecting the cement coating of the pipe proper having been eaten entirely through in several places. These results indicate very clearly that the immunity from electrolysis which these pipes have possessed in the past is due mainly to the fact that they were laid with cement joints, and that the same pipes laid with lead joints, as is now being done, are by no

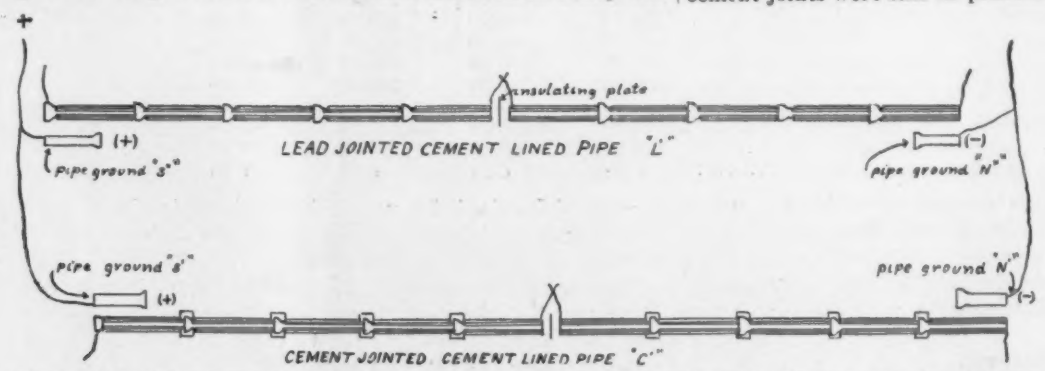


Fig. 1.—Showing Arrangement of Pipes for Comparing Effect of Lead Joints and Cement Joints in Cement Covered Pipes.

TABLE I.—*Showing Currents Flowing in Parallel Lines of Cement Covered Pipe, with Both Lead and Cement Joints.*

	June 19.	June 23.	June 30.	July 7.	July 14.	July 21.	July 28.	August 11.
Current in lead jointed line I_L	0.275	0.278	0,265	0.290	0.245	0.265	0.268	0.275
Current in cement jointed line I_C	0.0012	0.0011	0.0009	0.001	0.0008	0.0014	0.0009	0.0007
Ratio $\frac{I_L}{I_C}$	229	252	294	290	306	186	297	393

means free from trouble, the cement coating in itself not being effective in keeping the current off the pipe. This is further substantiated by experiments recently carried out at the Bureau of Standards on the subject of the electrolysis of iron imbedded in cement and concrete. Table II. gives specific resistance measurements on a number of samples of earth taken from around pipes in different cities, and also specific resistance measurements on specimens of wet Portland cement. The figures show that, while there is considerable variation in the specific resistance in both the earth and concrete, the average resistance of the cement and concrete is lower than that of the earth tested. Further, it has been shown by several investigators that iron imbedded in cement or concrete not only corrodes quite readily when an electric current flows from the iron to the cement, but the cement itself is soon destroyed by the mechanical pressure developed around the iron.

TABLE II.—*Showing the Relative Specific Resistance of Representative Specimens of Earth and Wet Concrete.*

Per Cent. Moisture in Soil.	Specific Resistance of Soil.	Character of Soil.	Character of Concrete.	Specific Resistance of Concrete after Soaking in Water 24 Hours.
10.23	8,709	sandy	....	.....
12.28	2,914	sandy	.....	... .
13.23	1,335	sandy	.....	.....
20.48	2,300	clay and vegetable matter	.....	.....
21.8s	1,074	earth and cinders	neat cement	6,100
26.53	.14,025	blue clay	1 : 2 mortar	3,200
5 97	44,440	yellow clay and gravel	1 :2½ :4 concrete	4,900
16.72	1,797	clay and gravel	1 : 3 : 5	4,700
19.29	3,783	blue clay	.....	. ..
Average for soil	8,930	.....	.....	4,725

Painting of pipes or otherwise insulating the surface by the use of treated papers and textiles was early resorted to as a possible method of protecting pipes from electrolysis, and this method is still resorted to in some instances. It is doubtful, however, whether there exists any instance in which it has been definitely proven that insulating paints have effectually protected pipes from electrolysis, while there are many instances where they have failed utterly and where their presence has probably done actual harm. This statement may seem somewhat surprising to some who are familiar with instances where paints have withstood the action of soils for a long period of years, and, when uncovered, both paint and pipes appeared to be in practically as good condition as when they were laid years before. Practically all such paints are commonly classed as insulators, and it is quite natural, therefore, the impression should be gained by many that these paints ought to prove equally as effective as a protection against corrosion in the soil. In practice, however, such paints behave in a very uncertain manner at best. A given paint may endure for long periods in some places while in other sections of the same city this paint may deteriorate rapidly and become worthless in a comparatively short time. This is due partly, no doubt, to differences in soil conditions, but the general failure of these paints under conditions where electrolysis was to be expected indicates that stray currents themselves may have something to do with the destruction of the coatings. With a view to throwing light on this point and also to determine if possible something of the relative value of different paints and coatings as a possible protection against electrolysis, the Bureau of Standards has undertaken a series of experiments which, although still incompleted, have yielded considerable definite information.

In testing a paint under conditions approximating those met in the prevention of electrolysis by stray currents it is very desirable to obtain for the test as perfect a coating as possible. This insures a test of the paint, not a test of a method of application of the paint itself. The object of this, of course, is absolute fairness to the manufacturer. To obtain a coating which comes up to the requirements of the test, a sufficient number of coats must be applied to completely eliminate all pinholes and flaws. The application should preferably be made to a flat, or nearly flat, smooth surface of iron having no projections or rough spots. Each coat must be thoroughly dried before the next is applied. Care must be taken to see that the surface on which the paint is to be spread is free from grease, scale or rust, especially grease, and that the paint is thinned sufficiently to spread well. In brushing on quick drying paints the brush should not be passed over the surface again after the paint has gained its initial set which usually takes but 2 or 3 minutes. The paint must be spread thin enough so that it will not run in ridges and dry or leave blisters. If these precautions are observed four coats of any paint are generally sufficient to give a coating free from flaws.

To obtain a smooth, nearly flat, surface, and at the same time a great many other distinct advantages, sheet iron cones, like those shown in Fig. 2, having 8-inch diameter of base and 1¾-inch altitude were made. The interior of the apex was filled with solder to a depth of ¼ inch and the inner seam, where the iron lapped over, was soldered to a smooth joint, thus making the cones water tight and doing away with the sharp corner at the apex which would be difficult to paint. The interior surface of the cone, after being thoroughly cleaned, was then painted according to the procedure set forth above. When the coat of paint was completed a portion of the surface, a little more than covering the solder at the apex of the cone, was strongly reinforced against electrical stress with a layer of felt saturated with asphaltum This did away with the effect of any chance projection of the solder, and made it certain that any possible failure of the paint would occur where the paint had been applied to a smooth surface.

(To be Continued.)

[CONTINUED FROM VOL. XCV., PAGE 414.]

PROCEEDINGS, SEVENTH ANNUAL CONVENTION, NATIONAL COMMERCIAL GAS ASSOCIATION.

HELD IN DENVER, COL., OCTOBER 24 TO 28, 1911.

THIRD DAY—MORNING SESSION.

Discussing the Gulbrandsen Paper,[1] *on Manufacturing Gas Mantles from Artificial Fibers.*

Vice-President Bigelow took the Chair, and called for discussion on the Gulbrandsen paper.

1. For the text of the paper, *ante*, p. 412.

(*Continued on page* 10.)

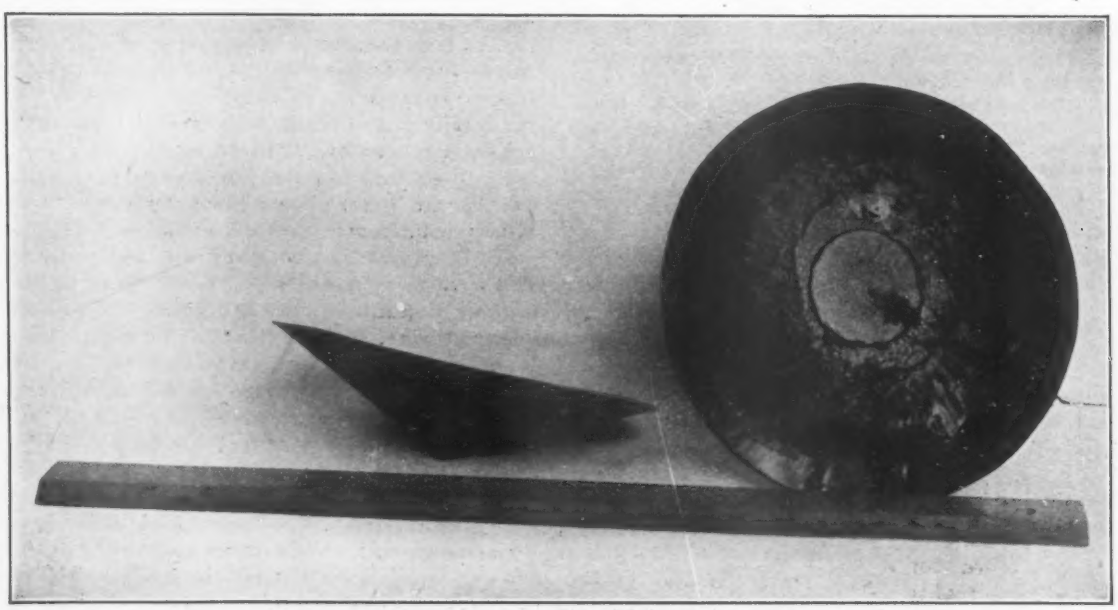


Fig. 2.

THE AMERICAN GAS LIGHT JOURNAL

Entered at the Post Office, New York City, as Second-Class Matter.

Published weekly at 42 Pine Street, New York City.

Telephone Call, John, 2996. Cable, Am-Gas.

A. M. CALLENDER & CO., - - Proprietors.

THOMAS J. CUNNINGHAM, ELBERT P. CALLENDER, } Editors.
H. THURSTON OWENS, - Associate.

CHARLES H. WADELTON, Manager.

Agents—American News Co., 11 Park Place, New York City.
Lemcke & Buechner, Berlin, Germany.
Aug. Siegle, 30 Lime Street, London, England.

TERMS OF SUBSCRIPTION.

United States, Cuba and Mexico, $3 per year. Canada, $4 per year. All other countries, $5 per year.
Single Copies, 10 Cents.

NOTICE TO ADVERTISERS.

New Advertisements and changes of copy therefor should be in hand Wednesday noon of week prior to date of issue.

NEW YORK, MONDAY, JANUARY 1, 1912.

[Official Notice.]

Annual Meeting, Indiana Gas Association.

The annual meeting of the Indiana Gas Association will be held in the Claypool Hotel, Indianapolis, on Wednesday and Thursday, January 17th and 18th. The paper list carries 7 numbers, and the social side provides for a dinner, the evening of the first day. There will be no formal exhibition of appliances.

[Official Notice.]

Forty-Second Meeting, New England Association of Gas Engineers.

New England Association of Gas Engineers,
Office of the Secretary,
East Boston, Mass., Jan. 1, 1912.

The Forty-Second Annual Meeting of the New England Association of Gas Engineers, will be held Wednesday and Thursday, February 14th and 15th, 1912, at Young's Hotel, Boston.

Papers are being prepared on:

High Pressure Distribution.
Gas Office Buildings.
Industrial Appliances.
Producer Practice in Water Gas Making.
Shavings Scrubbers.
Measurement of Flow in Mains.

And on other subjects of interest.

Members will dine together Wednesday evening.

Those who wish to join the Association should send in application to the Secretary before the meeting. N. W. Gifford, Secretary.

BRIEFLY TOLD.

The Old Year and the New.—The year 1912 is with us, and the spirit that animated the Nation just a century ago, which led to the eventful results springing from the contest known to history as the "War of 1812," is still all-pervading under the flag that blazons the way of the most virile people of the world. Whether or not it was politic, or for the best, to so widely extend the dominion of the States, may not now be determined; for prophesy enters not in these things as in any sense making a finality. Time alone is the final factor in that situation, and to time is it consigned. However, he indeed would be a humdrum one, though, who would, in rapid recasting of the century's happenings, not experience the thrill that comes with the positive knowledge that great things have been done within the cycle of the past 100 years; and, reasoning or calculating therefrom, as to that which confronts us on the portal of the next 100year cycle, attempts to estimate the heights to which we will go when the century is finally in are vanity. However, to come back to earth, and to the New Year Day of 1912, the fraternity of gas men have much to cause them thankfulness. Death, it is true, has visited us, and while several have gone who could still be of great comfort and service to their fellows, others were taken whose long records and praiseworthy, honorable ways stand for our knowledge that their sun was not even set, for the illuminings of their acts will for long time light us over the safe and successful path. The industry as a whole has prospered exceedingly, and while restrictive laws have, in individual instances, worked towards that which seems injustice, nevertheless it is true that, in the main, legislation affecting the artificial lighting industry, in a general way, has not been really restrictive. The Commission plan is now in full force in many States, and in New York another twelvemonth of State directing (rather supervising) looks to have established in fair measure that such supervision is more to be favored than feared. Certainly, capitalization of the inflated sort has been checked, for which the engineering division of the art should be (and more than likely is) thankful, since the impossible is not looked for from the generating house. In their entirety our reports from all sections of the country go to show that a trifle over 8 per cent. is the net gain in sendout for the year, and that the average financial returns to the shareholders for the year was 5.60 per cent., this being based on dividends per annum at par of 100. In this city tremendous advances were made in plant betterments, a goodly share of which (notably in Brooklyn) went to the improvement of distribution conditions. In the Brooklyn territory the strides taken in respect of output were enormous, three districts showing gains exceeding 160 per cent., and two of these were made in yearly outputs of over 200 millions cubic feet. As another instance of this great expanding in the section noted, we may mention the successful turning in of a holder, located in the Newtown district, up to storing over 10 millions cubic feet, and this leviathan stands on ground that, to the writer's personal knowledge, was, and had been for years, tilled as a truck garden. The giant plant of the Consolidated Gas Company, at Astoria, goes serenely on to completion, and here is another instance of marvellous transforming, for several of its huge structures stand on ground that 15 years ago was the haunt of the mudhen and the habitat of many a sort of wild thing—bird, fish or reptile. All this in 15 years, and proof of what is written here, may yet be fairly gleaned by a leisurely tramp over the noble engineering structure known as the Queensborough Bridge. Between Ravenswood and Astoria (or just between two huge plants of the Consolidated Gas Company) one may see the yet living (and sturdy, too) forms of huge oak, chestnut, birch and other forest giants, and right through their old-time paths one can also watch the temporary tracks of the Hicks-Johnston Construction Company, carrying cars loaded with earth obtained by cutting down small foothills bounding the forest patch, the substitution resulting in the establishing of noble highways. But, perhaps this savors too much of garrulity, so let us say the instance is cited at length merely to graphically show the wonderful developments going on in and about this city, and to prove that the advance in the covering of what was recently farm land to the dignity of sustaining business structures and houses, quick as it has been, is not speeding to the speed with which the artificial lighting men got into and over the same field. Taking the outlook in its full scope, the year upon whose outer step we stand promises greater results than, from a percentage point of view, those reported for any year in the last 10, and many will likely remember that 1903 and 1904 were by no means slow years. Speaking on Journal account, it is our pleasant province to declare that, in common with the industry at large, we have steadily gone on to better things. In midsummer we donned new dress and makeup, and our readers evidently agree with us that the change was for the better. We have endeavored to do that which we could, according to our light, for the advancement of an industry that has done more for the aiding, comforting and pleasuring of humanity than that done through or by any other industry. In this course we have been assisted by the industry as a whole, for all concerned in its development in active ways know that to their best interests we have always been faithful; and we further know that such faithfulness has been and is rewarded by their confidence and their help. In the hope and belief that 1912 will be another bright period in the century's chain we wish to all the heartest compliments of the New Year day.

CURRENT MENTION—

We are indebted to the attention of Mr. Chas. H. B. Chapin, Secretary of the Committee on Gas and Electric Schedules, Second Public Service District, New York, for a copy of the tentative findings of the Committee in respect of the duties assigned it September, 1910. The document shows that the Committee has evidently been neither indifferent nor inactive to the matters referred to it. Of course, this is not cause for wonder when one remembers that its Chairman is, Mr. J. C. DeLong, of the Syracuse Lighting Company, and that his aides include such representative men in the artificial lighting industry as these: T. R. Beal, J. T. Cowling, H. B. Crowell, J. T. Hutchings, M. W. Offutt, W. E. Griggs, F. B. H. Paine, A. C. Smith and C. E. Hunter. The Committee, as to its initial report, which bears date of December 18, states: "After numerous meetings and much study, a draft of the report to be submitted to the Commissioners has been tentatively adopted. We have decided, however, before submitting this report, to furnish a copy of it to each gas corporation, electrical corporation and municipality operating in the Second District, and to hold a meeting to which the corporations and municipalities interested may send representatives, and at which any suggestions or questions may be discussed and answered. We, therefore, inclose a complete copy of the report as tentatively adopted, and ask that, in case you have any suggestions to make or questions to ask, you should forward them to the Secretary, not later than January 1, 1912, in order that the Committee may have an opportunity to consider them before the meeting." The meeting will be held in the Hotel Ten Eyck, Albany, at 10 A.M., the 17th inst., and all are invited to have a representative at the sessions. While it is stipulated that suggestions on questions should be in the Secretary's hands to-day, and while we have no instruction to the contrary from anyone, it nevertheless looks tenable that any such matters that are in Secretary Chapin's hands by Thursday next will receive attention. Without attempting at this time to consider in any sense the appropriateness of the specifications or arrangings suggested, it seems altogether worth while to reproduce paragraphs 13 to 17 (inclusive) of the chapters devoted to "Outline of Work," which have to do with the Commissions' defining of the word "Service:"

13. Public service corporations and municipalities, operating gas and electric plants, produce and sell the commodities gas and electricity, but they are permitted to do so only under the condition that an adequate supply shall be available at all times to meet the demands of the public. They, therefore, also render a service, but in connection with the gas and electric business the word "service" is commonly used to include both the commodity and the availability of the supply.

14. It is at once evident that a fundamental difference exists between the gas and electric business and the manufacturing * * * and the railroad business * * * therefore no just comparison can be made between the methods for charging for gas or electric service and the article produced by a manufacturer or the service rendered by a railroad.

15. * * * The word "service" in the gas and electric business consists of two distinct elements; namely, the commodity gas or electricity, and the plant capacity which may be drawn on at any or all specified times.

16. The extent of the service furnished any consumer consists, therefore, of the quantity of gas and electricity consumed, plus the amount of plant capacity maintained on his account and subject to his demand. These are the two fundamental factors which, considered either singly or in combination, constitute the basis of all methods of charge.

17. Gas and electric service may be sold under different conditions, depending on whether the consumer is free to call for the demand element, at any and all times, whether at certain specified times, or at such times not specified in advance, as may be convenient to the furnisher. * * *

Gas men will be welcomed at the January meeting of the New York Section, Illuminating Engineering Society, which will be held the second Thursday of the month, in the usual meeting place. We are further informed by the Secretary that it is proposed to have an exhibit of lamps and other apparatus pertaining to street lighting, in the meeting room, Engineering Societies Building. The programme further provides for an illustrated lecture on modern practice along street lighting lines, and several new types of gas and electric lamps are to be shown and described.

The huge storage holder that it has been proposed for some time to erect at the Spring Garden station of the Baltimore Consolidated Gas, Electric Light and Power Company, is now a finality. The contract for its construction has been awarded to the Bartlett-Hayward Co., and the erectors propose to have it completed within 9 months. While we do not know its exact dimension, it may be generally stated that its height will be 222 feet 6 inches, its diameter, 219 feet, that it will rest in a steel tank, and that it will be up to retaining 6 millions cubic feet.

It is reported that Mr. C. W. Fair, of Atlantic, Ia., has purchased a controlling interest in the Webster City (Ia.) Gas Company, which corporation has been owned by Messrs. W. N. Merrill, C. D. Doolittle and W. J. Zitterell. Possession will be taken to-day by the new owners, and hereafter the duties of Manager will be assumed by Mr. C. W. Fair. Our informant adds: "The Webster City Gas Company is capitalized in $100,000, of which $61,000 has been paid in, the rest being held in the treasury. At least $15,000 will be expended in improvements by the new owners, one item in the betterments being a new holder, the present one (of only 30,000 cubic feet capacity) being altogether too small. It is proposed to put in several miles of mains, but that expenditure will not be made forthwith."

Action on the proposed or suggested strike amongst the employees of the Consolidated Gas Company, of this city, was again postponed to the evening of Friday, the 29th inst. At this time of writing (Friday morning) it seems unlikely that some sort of a meeting between men directly representing the employees, but in no sense representative of the union organizers, may happen, for certain men influential in the community are striving to bring such a meeting about. There will, however, be no such thing as a conference; that is, in the sense in which that word is usually taken in affairs of the sort under consideration.

Advices from San Francisco, Cal., dated the 21st inst., are to the effect that it is a settled fact that Mr. Van E. Britton and associates have accepted the franchise passed by the Board of Supervisors of Martinez, Cal., authorizing them to lay gas mains along the county roads to hook up the towns of Antioch, Pittsburg, Bay Point, Concord and Martinez, for an artificial gas supply. The home office of the concern, which is to be in charge of Mr. Britton, will be located in Pittsburg.

We are indebted to "F. M. L.," writing from Connellsville, Pa., under date of the 23d inst., for the following:

"The first of a series of meetings to be held by the employees of the Fayette County Gas Company in this section was in session last evening in the office of Superintendent J. E. Angle, at this place. In all 25 employees of the Company gathered in the Superintendent's office. They came from Connellsville, Uniontown, Scottdale, Mt. Pleasant and Youngwood, comprising the district, which extends from the West Virginia line to Youngwood. Other meetings will be held each month, the next being scheduled January 26, at Uniontown. Superintendent Angle is holding these staff meetings for the purpose of enabling the Company to give better and more satisfactory service to its patrons. The clerical employees, meter men, foremen of construction and other officials were present. Some days ago Superintendent Angle addressed a note to his men on the subject of courtesy to the public. At last night's meeting the matter of courtesy on the part of the Company employees to their patrons was discussed at length. The various points brought out by Superindendent Angle were taken up. The Superintendent believes that a better feeling can be brought about between the Company and its patrons. He is anxious that the best possible service be given by the Company and is holding the monthly meetings with this end in view." His address on courtesy was as follows:

The possession in marked degree of any worthy faculty, should always be an incentive to develop that faculty. This Company considers that its agents and other representatives possess, above the average, the faculty of being courteous to the public. To those who cultivate and exercise this faculty, the Company extends its congratulations and its thanks; to those who do not fully appreciate its importance, careful consideration of the following is suggested:

1. The principle that underlies courteous treatment of others is simply that of doing unto others as you would they should do unto you.

2. In a highly complex and technical business such as that of this Company, there are many things that you, with your training and daily experience understand with perfect familiarity, but which the public do not understand; therefore, do not assume that the public should comprehend them without asking questions; but when inquiry is made of you personally, or by telephone, give the courtesy of a reply just as full and clear as you can make it, and without any suggestion of superiority born of a greater knowledge.

3. Words are only one means of expression, and manner is quite as important; therefore, remember that a kindly and gracious manner is not only the sign and mark of a self-respecting man, but is to your words what oil is to machinery in making them move effectively.

4. True courtesy is no respecter of persons. It remembers that "a man's a man for a' that," and gives the civil word and the helping hand quite as readily to the ill-clad stranger as to an official of the Company.

5. Courtesy is not only something the public have a right to expect of you, but it pays. It pays in the friends it makes you personally and as a representative of the Company. It pays in minimizing the friction of your life, as well as that between the Company and its patrons. It pays in raising your standing with the Company. It pays in the personal satisfaction resulting from having done the right and kindly thing by your "neighbor." It is the wish of the management of this Company that all its representatives, whose work brings them into contact with the public, may appreciate and fully measure up to their duty and privilege in this respect.

(*Continued from page 7.*)

A Delegate asked how the retail value of the mantle corresponded with that of the ordinary mantles?

Mr. Gulbrandsen said he knew little about the commercial end of the subject, but thought the difference would not be important.

Mr. Hanlan remarked that although Mr. Gulbrandsen claimed he was only a chemist, the speaker thought all would agree that he had just given them as fine a demonstration of the character ever seen at one of their meetings. Having been through the Welsbach factory many times, still the demonstration was extremely interesting to him. As to the amount of damage occurring to mantles through rough handling, the Public Service Gas Company, of New Jersey, was in the midst of a campaign during which it had sold (to October 21st.) 37,638 lamps, and he brought this up to emphasize the fact that, with the large number of men of slight experience selling these lamps, numerous instances had been brought to his attention where the men had put on over 100 lamps without breaking a mantle. This showed remarkable improvement in the construction of mantles – the mantles were those reproductions of which had been thrown on the screen.

Mr. Stannard assumed the Chair.

Mr. Bond said that in the photometrical laboratory of the United Gas Improvement Company they had occasion to test various sorts of mantles, and he thought the figures given by Mr. Gulbrandsen as to the deterioration in candle power yielded from various mantles was probably too large. A clue given by him to this was what he said respecting mantle shrinkage. Certainly, if the consumption were not adjusted properly carbonization would be caused. They had come to the method of rating a mantle (or efficiency of a lamp, for that matter) by the illuminants; that is, the light given in its relation to the total candle power per B.T.U. It was well known that the light yielded by a mantle varied with the heating value supplied to it. So, taken on that basis, adjusting the gas for the condition in which the mantle was found, the fact was proved that, even up to a 1,000-hour period, the depreciation in the candle frequently had not fallen below 10 per cent. He thought that was the proper basis on which to judge mantle depreciation. As the mantle shrank—probably taking a better form in some cases as matching the flame given to it from within—there should be a corresponding reduction in the quantity of gas used. That was important. Ten per cent. was a vastly different deterioration from the 55 to 60 per cent. claimed by some people.

The President said they all realized that Mr. Gulbrandsen's article formed a splendid paper that could profitably be given a great deal more time in discussion than they could afford; but in view of the short time at their command he would ask Mr. Gulbrandsen to briefly close the subject.

Mr. Gulbrandsen having said that there was nothing further that he wished to add, the President called upon Mr. William J. Clark to present the recommendations of the Committee appointed to consider

CHANGES IN THE CONSTITUTION AND BY LAWS.

The changes as suggested were unanimously indorsed, on motion of Mr. Clark, seconded by Mr. Hare.

The President called for the

REPORT OF COMMITTEE ON PRESIDENT'S ADDRESS,

which was read by Mr. C. W. Hare, as follows:

Gentlemen: Your Committee feels that the Association owes President Stannard its lasting gratitude for having so ably carried its work through the most successful year of its career. Through his unfailing vigilance, no opportunity has been allowed to pass which might, in any way, have been turned to the advantage of the Association, and in his able address he points most clearly to the matters yet to be undertaken by the Association, if it is to fulfill the glorious destiny awaiting it.

One of the most important matters considered in the address was that concerning the amending of the Constitution, so as to permit of the formation of company membership. This recommendation was deemed of such importance that, as you all know, favorable action was taken on it this morning. Now that the Constitution permits of this development, your Committee urges upon the incoming board immediate importance of appointing a committee to work out the details of such a movement.

Your Committee wishes to emphasize the importance of the work started by the outgoing administration in connection with the "Salesmanship Course." Such a Course is of the greatest importance to the successful development of the commercial gas men, and the Association is to be congratulated that this most excellent idea has been so splendidly taken advantage of.

The watching of litigation, the fallacy of limited term franchises, the antagonism of an uninformed public, the integrity of gas securities, the mistaken fallacy of special taxes, are indeed, all matters deserving of the most careful study of trained minds; and it is unreasonable to expect that work of this character should be undertaken by your members gratuitously. At the present time, the available funds of the Association are insufficient to defray the expenses of successful work of this character. This deficiency can in part be made up through the most active support of the gas companies of the country.

Your Committee feels that the National Commercial Gas Association has established its usefulness to the gas fraternity and warmly approves Mr. Stannard's plea that the gas fraternity in turn support the Association to the utmost of its ability.

A PINNING BEE.

Here the President called on Mr. L. S. Bigelow who reported that which had been done by the Emblem Committee, in the way of getting up a pin for the treasuring of the past Presidents and of those present and future who would reach the "past stage." Suitable responses were made on account of the receipt of such pins by Messrs. R. E. Slade and F. W. Frueauff. In time Mr. Frueauff, on behalf of the Association, pinned the badge of the Association on Mr. Bigelow's left upper lapel.

OTHER COMMUNICATIONS.

Secretary Stotz read a letter from Mr. W. P.Carstarphen who, on behalf of the Colorado Electric Club (as its President), invited the members to luncheon to be served in the Hotel Albany. The invitation was properly accepted. He then called attention to the itinerary of the trip to be taken the following day, and reminded the members that the appliance exhibition was underway, and that the gates of the plants of the Denver Gas and Electric Company were wide open to them.

The President announced that, as Mr. P. R. Jones, Auditor of the Doherty Operating Company, was not present, his paper on

INCREASED EFFICIENCY IN SCIENTIFIC OFFICE ACCOUNTING,

would be read by Mr. W. H. Gardiner, Mr. Gardiner read, as follows:

Mr. Frederick W. Taylor, in his paper on "Scientific Management," presented to the American Society of Mechanical Engineers, stated: "The principal object of the managment should be to secure the maximum prosperity for the employer, coupled with the maximum prosperity for each employee."

This statment presents an ideal combination, but one that can only be brought about by co-operation between the management and the employees, and the scientific direction of the work to be done by the individual. Probably to-day no other subject is receiving greater consideration by executive heads of gas companies than that of how to increase the efficiency of operation and to establish the most economical operating conditions. But, in general, economies brought about are largely through the installation of labor saving devices, machinery of higher efficiency, or through the working out of engineering problems; and that little or no attention is given to the scientific analysis of conditions which retard employees from reaching their highest state of efficiency, the consequent loss both to the company and to its employees being disregarded.

In the past few years, however, what has come to be known as scientific management had demanded the attention of those seeking to better existing conditions both from the standpoint of the company and the employee. Many of the greatest corporations are making elaborate analyses not only of all physical conditions affecting the company but also of those affecting the employee', his needs, capabilities and the work for which he is best adapted.

It is difficult to present, within the time allotted for this paper, more than a general idea of what scientific management means; but it is the writer's desire, if possible, to bring before you suggestions that may result in benefit to your companies.

In all companies numerous opportunities may be found for improvement and economy. These opportunities are often overlooked until conditions confronting the management demand that radical retrenchment or improvement be made; and very often, due to the need of haste, such changes as are then made have a reverse effect to that anticipated. This result can be attributed to the fact that a

proper analysis of the causes governing defects had not first been obtained. The writer is of the opinion that the various departments of a corporation are so closely allied to the accounting department that an increase of efficiency in such department will in some measure be reflected in each of the other departments. Therefore, his remarks will be confined to matters which would seem to most deeply concern the office manager; that is:

(A.) Efficiency of office employees.
(B.) Economy and accuracy in accounting methods.

(A.) *Efficiency of Office Employees.*—One of the chief worries confronting the manager is the difficulty he finds in obtaining efficient assistants. In any office will be fonnd men with recognized ability, who are the standbys of the management, and some others who are a source of worry and detriment to the company. This latter class is not composed of men who are necessarily inefficient, but rather are their efforts misdirected. It has been the writer's experience that, where an accounting office shows excessive labor costs, the chief cause can be traced to the fact that the capabilities of a clerk employed were not analyzed to see whether he was adapted to the par ticular line of work assigned him or steps were not taken to develop his capabilities.

The management can well afford to spend much time and money on the instruction and training of employees, and, after carefully noting the characterists of each individual, assign him to the work for which he is best fitted. If this were done in but a short time the force would be in a high state of efficiency and a considerable net saving in labor costs would result to the company. This benefit would not accrue alone to the company, but would also accrue to the individual, since the management can then well afford to pay a higher scale of wages than would be possible where inefficient men are employed; and this because a saving in the number of employees would be effected if each employee were selected and assigned to work for which he showed the greatest natural inclination and for which he has been trained.

The poorest form of economy is the employment of cheap and inefficient labor, for seldom will you find this class possessed of sufficient initiative to work for the interest of their employer, or for their own interests. They require constant watchfulness on the part of those whose ability could be used to advantage elsewhere, and very often (due to errors made, clerical or otherwise, and because of general indifference) create a bad influence on customers. The customers' opinion of a quasi-public corporation is largely formed through "service" and "contact" with one or two of the company's employees. If the employee can be brought to realize the value of creating friends among the public, not only for the company but for himself, it will not be long before the dollars and cents value of such attitude will become apparent.

The aptitude of an employee must be considered and his energies directed. A good man is oftentimes spoiled and set down as a failure, due to lack of intelligent instruction, notwithstanding his willingness to learn the work assigned him. This takes the heart out of a man, and the company's interest suffers in consequence. The clerk should be thoroughly instructed, not only as to the best and most economical way to do his work, but also of the effect failure on his part to work at the highest point of efficiency has upon others. The average man, left to his own devices, seems to work along the lines of the poorest instead of the brightest of his associates, and the amount of work accomplishcd each day is but little above the general average of the most inefficient man employed. If an analysis were made of the work done by each man, the possibilities of betterment will be apparent, and the manager may well insist upon bringing the standard up to that set by the man of highest efficiency. By doing so, through the saving effected, he will be able to pay a higher scale of wages, and the employee will soon realize the value of working at the highest possible efficiency.

For example, I cite the item of customers' ledgers. Probably most of the office managers will agree it is difficult to obtain men for this class of work who will intelligently watch the company's interest. If, before placing a man on the customers' ledger, his temperament, characteristics, accuracy and faculty for taking the initiative, were considered, a company could well afford to employ the highest priced man because of the saving he would effect monthly. If a man is working on the books, and his natural bent and inclination are along other lines, he is working against himself and at all times trying to overcome his dislike for the work he has to do. A school of practice, or an office improvement association, will do more to create friendly rivalry and incentive for better work, and bring about a higher state of efficiency, loyalty to management and to each other, than any other one thing. The employee begins to feel he is not a mere part of the machine, but, through a knowledge obtained of other departments, and realization of how faulty work on his part may affect the work of other departments, he appreciates the necessity of doing his work in the most exact and efficient manner.

If the work of an office were analyzed and the system of scientific direction of the men employed were followed, the saving to a corporation, and consequent increased benefits to employees, would be most surprising to those who gave due thought to all problems in volved. But one cannot hope for material betterment unless a detailed investigation of all conditions is made. A superficial canvass of the situation will not do, nor can improvements be made in a day. It is necessary to study the relation of the accounting department to all other departments, and it is as essential to instruct a man on the service gang, so far as his work may relate to accounting, as it is to instruct the accountant. An office force may be efficient and yet seem to appear inefficient, due to the fact that the allied departments are left more or less to their own judgment as to their own relation with the accounting department. The lost time and added expense in most all companies, due to lack of understanding as to just what is to be done, are enormous. Friction between men or departments should not be tolerated, and the employee should be brou ght to feel that his interests are identical with those of the management, that his advancement depends solely upon his contribution to final results.

A highly efficient office must be led by a highly efficient man, one thoroughly in sympathy with his work and the management. The greatest care should be exercised in the selection of the executive head of the office department. His characteristics should be closely studied, as a man is very apt to surround himself with men possessed of more or less the same qualifications as himself.

(B.) *Economy and Accuracy in Accounting Methods.*—Every corporation should maintain as elaborate a system of accounting as is consistent, the ultimate object being to present in detail as full analysis of all vital conditions relating to the company, as is possible. Unless a system permits presenting absolute facts it is impossible to determine wherein operating charges may be decreased and one cannot intelligently make an investigation with a view to improvements. Corporations often find themselves in difficulties, due to lax and faulty records and consequent inaccurate statement of conditions. Before practice economy can be brought about in an accounting department it is essential to eliminate all unnecessary steps and wasteful methods. If a company has not devoted considerable time and attention to its accounting system it may well begin to do so, for by this means conditions which it now believes to be economical will be found subject to much improvement. In many companies the amounts of lost motion and useless work done each day in the accounting office are great, and primarly due to the fact that additions or subtractions to a system have been made without due thought as to wherein the new method may conflict with the old. In order to obtain the highest economical efficiency of an accounting system each step must mean something, and if there is duplication of the work it retards ecomomical operation to that extent. Duplication also affects the efficiency of a clerk, as to him it appears unnecessary, and either he must be convinced of the necessity of this work, or his opinion given due consideration as to the advisabiliiy of eliminating it. The value of an accounting system which gives a panoramic view of the entire operating and financial conditions in all details is apparent. It is not sufficient to merely consider the classification of accounts. Every condition requiring a special form or record should be carefully analyzed, in order that records may be produced and kept with the least possible expense and present the greatest amount of information. Care should be taken that no record conflicts to the disadvantage of a record kept by another department. Accounting work should be so systmeized that the greatest amount may be done in the least possible time and this is what all managers should strive for. Increased new business sometimes seemingly handicaps a force, and immediately new clerks are hired to relieve the congestion, when perhaps the system in use is responsible for the fact that the work cannot be handled by the present force. If an employee is to work at the highest point of efficiency he must be given satisfactory tools with which to work. An accounting system may become cumbersome through the addition of various forms and records, which, on inv estigation, might be simplified without impairment by elimination or by combination of records Gas companies generally have their own peculiar accounting conditions to meet, and systems installed to be of value

should fill such requirements. The writer is a firm believer in a standard uniform system of accounting that possesses sufficient elasticity to be either enlarged or condensed as conditions may warrant.

Essential qualifications for economy in an office are accuracy, speed and the elimination of features which retard the employee. In this connection the value of modern time-saving devices for increasing efficiency should be considered by the management. The development of office labor saving appliances has advanced greatly during the past few years and the manufacturers are studying and analyzing your needs. Many appliances of merit are now on the market, and information heretofore requiring the employment of a number of clerks can be obtained almost automatically at a minimum of cost and labor. By taking up with the manufacture your peculiar requirements they will be able to give you a machine that will adequately fill your needs. While perhaps the constant use of automatic calculators tends to dwarf personal ability for mental figuring, the time saved more than offsets this factor, for the use of automatic circulators means a greater degree of accuracy, speed and economy. The initial cost of some of the appliances now on the market may perhaps appear high, but a study of your office requirements may prove the expenditure was more than warranted.

In closing, the writer desires to mention the opportunities of the office man. It is the impression of many office men that there is "no future ahead" for them. There is to day a greater scarcity of the rightly educated sort of office man than has existed before, and this condition has been brought about through scientific office management setting a higher standard. A business presents no greater field where a man so quickly may mould a position to his own liking as in the office. If the directors of a corporation are seeking executive officers the man who has had office experience is most apt to get the appointment if he is at all versatile in understanding the business from other angles. If the office man is in sympathy with his own and the other departments of his concern, he is going to be elected to a larger position if the head of his own department and other department heads have any voice in a selection. If you trace the history of the heads of many of the corporations represented in this Association you will find that many managers of companies are graduates of the office, and probably each one who reads this paper may point to a number of his previous associates in an office who are now holding responsible positions.

The reading of the paper finished, owing to the hour for adjournment having arrived, the discussion was ordered put over to 2 P.M.

(To be Continued.)

Special English Correspondence.

COMMUNICATED BY NORTON H. HUMPHRYS.

SALISBURY, ENGLAND, December 9, 1911.

What is Coal?—The President of the Institution of Gas Engineers Defends the Profession.—Public Lighting of the City of London.

Many who have spent long and useful lives in handling millions of tons of coal, would be nonplussed if requested to give an answer to the question—what is coal? They have possibly made thousands of practical working analysis by treating it distinctly for the production of gas, coke, tar, ammonia and sulphur, not to say cyanogen and a few other odds and ends. They have taken it to the laboratory, and determined the various elements that go to make up its constitution, as percentages of carbon, hydrogen, oxygen, nitrogen and sulphur. They have found that uncertain quantities can be dissolved out by treatment with solvents, such as pyridine and sodium hydrate. Beyond that, they have drawn blank. So that the scientist who attempts to answer this difficult question must draw to some extent on circumstantial evidence, such as the information afforded by the geologist as to the conditions under which coal was formed, and there is danger of his being drawn into inconsequential vaporings about carboniferous eras and other things that may or may not have happened.

Bearing this in mind, one turns with an unusual degree of interest to the first of a series of four Cantor lectures delivered or to be delivered by Prof. Vivian B. Lewes before the Royal Society of Arts, on the carbonization of coal, than whom no one is more capable. If it is possible to interest an audience in a dry and barren subject, Professor Lewes proved on Monday week that he is the man to do it. Starting with the question, he spoke fluently and without pause for 70 minutes before arriving at the conclusion that coal is a conglomerate of humus and its degradation products with the resinic bodies and their derivatives. Not one word of the discourse was superfluous or foreign to the argument. There was the same careful discrimination between fact, deduction and opinion that has been a feature of the Professor's utterances in the past, and which has led them not only to be listened to, but read with delight and appreciation. And there was a skilful avoidance of all sorts of tall talk such as the probable conditions of life in the carboniferous epoch. As the lecture is sure to be issued in verbatim form it would be superfluous to attempt a digest of the various arguments advanced, and any abstract must fail to carry the force of the original.

Even if a full answer to the question is beyond our capability. Prof. Lewes shows that much may be learned, in connection with such practical points as the coking qualities of coal, and the effect of exposure to weather, from a careful digest of the incomplete results already arrived at. Having found such a barren and unsatisfactory question so successfully disposed of, one is encouraged to expect a great deal in the remaining course of the series which will deal with modern carbonizing plant, etc. With the numerous claims on behalf of verticals, chambers, slopers, light charges, heavy charges, etc., before him the gas engineer is thankful for any information that will help him to appreciate the good points of each.

Mr. R. G. Shadbolt, President of the Institution of Gas Engineers, while presiding at a lecture given to the members of the Manchester District Junior Gas Association, took occassion to give a flat denial to the uncalled for suggestions lately made by a writer, who very wisely prefers the protection of a *nom de plume*, and who, not satisfied with running down everything connected with the gas industry, on the discreditable lines adopted by the electricity publicity committee, has had the assurance to state that gas engineers, as a body, are inferior to other professional men. Possibly the anonymous writer has risen to such a high plane of scientific training and knowledge himself, that he is unable to get a clear grasp of actual facts as they stand to-day, although there is no evidence of any ability out of the track of the ordinary journalist in his utterances. Having noted with pleasure the endeavors of the Association to keep to the front in practical and technical work, Mr. Shadbolt proceeded to remark that quite recently gas engineers had been girded at—ignorantly he believed—as being very ordinary and very unscientific, especially when compared with those engaged in another industry. There was no doubt the gas engineer of to-day was a thoroughly practical, technical and scientific force, ready to take his place in his own particular industry, and he would say most emphatically that in no other industry of a commercial character were there more capable, more thorough, and in the strict sense of the term, more scientific men being produced than was the case with the gas industry to-day. He was prompted to make these observations on an occasion like this because of the questions that were frequently raised in certain quarters to the detriment of Gas Engineers Associations.

Probably the statement so emphatically denied by Mr. Shadbolt, is due to the common methods by which electricians prove their extravagant claims to superior scientific skill. If they want to make a comparison between electricity and gas, they take the best and latest electric lamp, but rummage in the dust heap for an old, worn out and badly corroded fishtail gas burner. And in a similar manner they would compare the training of a young man just fresh from a full course at the technical school, with that of an elderly gas engineer who took up his position 50 years ago, at a time when technical education, as now understood, was unheard of. There are none so blind as those that won't see.

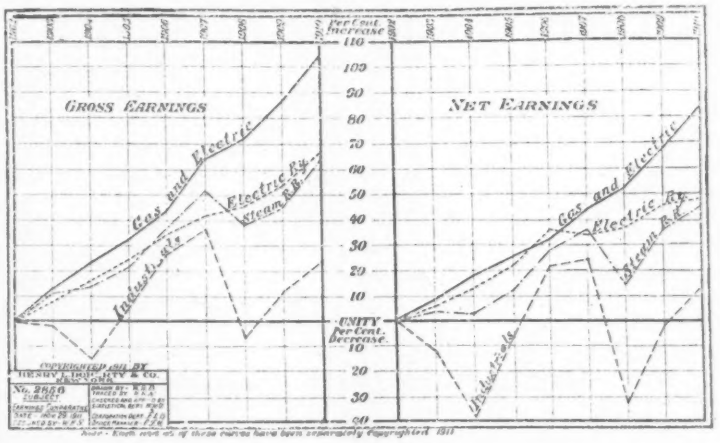
A new scheme for the lighting of the city of London has been adopted, settling the question for the next 10 years, and leaving the position of equal favor as between gas and electricity unaltered. The present cost is £10,099 for gas, and £10,772 for electricity, and under the new scheme the cost will be gas, £6,772, and electricity, £7,323. There is a cash saving of nearly £7,000 per annum, no less than 35 per cent. on the total. But this is not all. The Gas Company increase their total illuminating power from 277,000 to 388,000 candles, and the Electric Company from 392,000 to 892,000. This remarkable reduction in price, from about £40 per 1,000-candle power, to £20 of gas, and from £26 to £8 in the case of electricity, cannot but attract attention, and that ever watchful body the Electricity Publicity Committee will not fail to make capital out of £8 for electricity as against £20 for gas, without giving the obvious explanation—that the Electric Company lights about 10½ miles of main thoroughfare with about 500 points, and the Gas Company 46 miles consisting mostly of by

streets, with more than double that number. While the Electric Company average about £15 per lamp the Gas Company only get about £6. Under these conditions there is no fair comparison as it is obvious that the higher the average lighting power the lower will be the cost. It seems remarkable that more than double should be spent on 12 miles of main thoroughfare than on 44 miles of streets, some of which are not less either in width or importance. A ratio as regards mileage of 1.4 might be looked for, but 1.9 seems high. A peculiar feature about the city lighting is that neither party are anxious for the whole, on account of the difficulties connected with a renewal of mains throughout the chief thoroughfares, and no doubt the point has influenced the conclusion arrived at. It is also necessary to observe that the "City of London" is a very small area as compared with the extent of the whole metropolis. It is only about 1 square mile, and one can scarcely define the total metropolitan area. Certainly it is well over 100 miles, and to go from one end to the other takes as long as a journey half across the country. Some of the suburban areas are much more extensive, both in the matter of content or of length of streets. We know the reason that has enabled a reduction of 50 per cent. on the cost of gas, it is the introduction of reflex burners and high pressure lighting. And it would be interesting to know how such a large reduction in the cost of electricity has come about, and whether the ordinary user may hope to participate in it. The most notable feature of the new contract is the introduction throughout the whole of the main thoroughfares, of centrally suspended lights with lowering attachment, applied equally to gas and to electricity. Lamp columns or brackets are cleared away. A few weeks since I took an evening stroll round the city—not over the whole 12 miles – for the purpose of observing the effect of this system which has only been adopted in one or two places in England. The cables supporting the lamps are invisible at night, and the light which, of course, must be supported at a height of not less than 25 feet, presents a weird appearance of the "Mahomet's coffin" or "floating lady" character, and the clean aspect of the street, where posts or columns of all kinds have been removed certainly commends itself from an aesthetical point of view. But the light center must be powerful, and in order to get a proper light at the outer edge of the sidewalk, and for about 10 feet up the buildings, which is necessary to enable names and numbers to be distinguished, there need not be a large excess of light in the center of the road where it is not required. In a wide thoroughfare, two side lines of lights might be preferable to the one central. So it would appear that suspended lighting is to some extent a light *de luxe*, and it would not have been practicable in the absence of special powers. Under their Act of 1900, the corporation can affix to the front of any building abutting on a public thoroughfare, pipes, wires, services and attachments. An adjoining metropolitan borough, that for the district of Holborn, which appears to be lighted partly by gas and partly by electricity, under a similar happy family arrangement to that obtaining in the city of London, have also entered upon a 10 years' public lighting agreement on very favorable terms. The present cost is £7,102 per annum, and the total light, 148,000 candles – about £48 per 1,000 candles. And for a slight addition of £543, bringing the annual cost up to £7,645, they are to receive 444,000 candles. More than that, the payment includes about £8,000 that might be called capital charges, for the alteration and adaptation of 1,822 standards. Allowing for this, the actual charge for light shows a reduction to £6,845 per annum or about £15 per 1,000 candles. These figures are considerably higher than those for the city of London, which is to be accounted for by the fact that the number of points is much larger, and the cost of maintenance, cleaning, etc., is proportionately increased. There would be practically not much difference in the cost of cleaning a 400-light and a 2,000 power lantern, over the twelvemonth. The number of visits would be the same irrespective of size. The same as regards lighting and extinguishing. The cost per 1,000 candles will depend upon the average cost per lamp. In a small country town using 80 or perhaps 100-candle points it could not be less than £30 to £50. But after making every possible allowance, the reductions in cost per 1,000 candles are remarkable and afford much material for thought. Can any other manufacturing industry show anything like a similar reduction?

THE Consolidated Gas Company, of Red Bank, N. J., has taken over the gas appliance business heretofore conducted in that city (1908) by Mr. Theodore R. Tenbroeck. This will likely prove a good move all around.

Management & Commercial Methods.

GAS AND ELECTRIC EARNINGS CHART.—Messrs. H. L. Doherty & Company, of New York, have just issued the chart here reproduced, and



the accompanying statement explains that each line shows for each year the percentage of increase or decrease in gross and net earnings of properties in the four classes shown, all being based on the figures for the year 1902 as unity.

In the preparation of this chart lines for steam railroads were derived from the combined gross and net earnings of all the steam railroads of the United States. The "Industrial" curve was deduced from the combined figures of such operating "Industrials" as are listed on the New York Stock Exchange and as could be traced back to 1902. The magnitude and diversity of this group are evident from its having gross earnings of about 1¼ billion dollars for 1902 alone.

The electric railway and the gas and electric light curves are based on combinations of all figures obtainable without selection, and cover most of the large cities of the country, not including New York.

Messrs. Doherty & Company point out that the curves show that gross and net earnings from the gas and electric business increased most rapidly, and were practically unaffected in their rates of increase, even by such panic conditions as those of 1907 and 1908. It will be noted that the gas and electric properties are the only ones, which, during the entire period shown, experienced no decrease for any year in net earnings; while the gas and electric and street railway properties are the only ones which showed no decrease in gross earnings, although the rate of increase in gas and electric companies lessened in 1908. Mr. Doherty, whose organization controls public service corporrtions in many cities all over the United States, advises us that this slacking of the rate of increase of gas and electric company gross earnings in 1908, while net earnings were unaffected, was due to the fact that many managers of lighting plants made the mistake of curtailing their business-getting expenditures during the period of panic conditions.

The comparisons shown by this chart are intended to illustrate the superiority of the securities of gas and electric properties for investment purposes, especially for a long holding, where investment (not speculation) is sought, but these curves illustrate many other interesting things.

The electric railway earnings (both gross and net) are much steadier than those of the steam railroads, while the most violent fluctuations are noticeable in the "industrials." This is as one might expect, for while electric railways derive almost all of their revenue from passenger travel, the steam railroads are much more dependent on freight business, wherefore the volume of this latter in turn is largely dependent on industrial conditions.

While under the name "Industrials" is included the business of companies supplying food stuffs and wearing apparel, yet, to a greater extent, this industrial group is engaged in supplying construction and maintenance supplies and materials, such as steel, cement, railway cars, locomotives, etc. Obviously, purchases of these latter will be these first curtailed in hard times and we get the violent fluctuations shown in the "industrial" curve.

Inasmuch as market values are to a large extent dependent on earnings, one might be tempted to ask why there is so much speculation in many railroad securities when the much greater fluctuations of the earnings of industrials would seem to point to these latter as a more profitable field for speculative operations. On the other hand, the absence of fluctuation of gas and electric earnings tends to explain

the fact, that outside of the large companies in New York and Chicago, there is little if any speculation in gas and electric securities, and that these securities are almost entirely purchased and held by those desiring permanent investments in safe and profitable enterprises.

Looking at this chart from an entirely different point of view it may be noted that in all lines the gross earnings have shown a greater percentage of increase than that of the corresponding net earnings. This would seem to show, among other things, that the costs of materials or labor, or both, have increased more rapidly than prices have increased, and this regardless of the much greater volume of business done in 1910 than in 1902. This is particularly interesting in view of the general downward trend of prices for gas and electric services during the last decade. It shows that they are more and more coming to find their net earnings, in an ever-increasing volume of sales with decreasing net profits per unit of sales, rather than in former comparatively small sales and larger profits per unit of sales.

Recent Patent Issues.

Prepared for the AMERICAN GAS LIGHT JOURNAL by ROYAL E. BURNHAM, solicitor of patents and counselor in patent causes, 833 Bond Building, Washington, D. C., from whom illustrations and specifications of any patent mentioned below may be obtained for 20 cents.

1,009,739. Machine for Discharging and Charging Gas Retorts. A. A. Guest and W. P. Gibbons, Lower Gornal, England.

1,009,943. Gas Well Construction. G. H. Trainer, Salem, W. Va.

1,009,969. Igniter for Gas Lamps. F. W. Hill, Chatham, Pa.

1,010.049. Alternating Gas Burner Attachment. F. G. Hirst, Philadelphia, Pa.

1,010,081. Globe Holder. W. J. Sloan, Pittsburgh, Pa.

1,010,119. Gas Lighting Device. J. M. Corwner, Ottumwa, Ia.

1,010,242. Gas Producer. A. B. Euff, Pittsburgh, Pa.

1,010,247. Gas Controlling Device for Burners. E. E. Frederick, Bellevue, Pa., assignor to the Frederick-Elder Company, Pittsburgh, Pa.

1,010,275. Inverted Incandescent Gas Lamp. G. Lentschat, Schmargendorf, Berlin, Germany, assignor to Favorit Brenner Fesellschaft mit beschrankter Hoftung, Berlin, Germany.

1,010,445. Gas Burner. R. Momand, New York City, assignor to Pressure Lighting Company.

1,010,665. Valve Mechanism for Gas. C. H. Miller, Cleveland, O.

1.010,897. Electric Gas Lighter. H. D. Grinnell, Pittsfield, Mass.

1,011,456. Gas Heater. F. C. Ludlow, Cincinnati, O.

1,011,530. Gas Producing Apparatus. L. H. Upton, Chicago, Ills.

1,011,572. Gas Pressure Regulator. E. J. Burns, Chicago, Ills.

1,011,578. Gas Producer. William B. Chapman, New York City, assignor to W. B. Hopping, trustee, same place.

1,011,643. Gas Lighter. F. H. Pomeroy, Haverhill, Mass., assignor to Safety Gas Lighter Company, same place.

1,011,932. Coke Oven. W. Feicks, Bethlehem, Pa.

1,011,933. Coke Oven or Gas Furnace. W. Feicks, Bethlehem, Pa.

1,011,961. Air-Gas Apparatus. A. C. Ionides, Jr., London, England.

1,011,988. Gas Tank Absorbent Filler. W. J. Moeller, Wyoming, O., assignor to The Philip Carey Manufacturing Company, Lockland, O.

1,012,054. Gas Stove. F. K. Berry, Battle Creek, Mich., assignor to A. B. Stove Company, same place.

1,012,120. Process of Operating Gas Producers. C. Barmore, Jr., Paterson, N. J., assignor to The Improved Equipment Company, New York City.

1,012,272. Process of and Apparatus for Purifying Ammonia. J. D. Pennock and E. C. Witherby, Solvay, and W. H. Blauvelt, E. N. Trump, and C. G. Tufts, Syracuse, N. Y., assignors to Semet Solvay Company, Syracuse, N. Y.

1,012,273. Art of Recovering Ammonia from Ammoniacal Liquor and Apparatus therefor. J. D. Pennock and E. C. Witherby, Solvay, and W. H. Blauvelt, E. N. Trump, and C. G. Tufts, Syracuse, N. Y., assignors to Semet-Solvay Company, Syracuse, N. Y.

1,012,453. Gas Burner. F. P. Schroder, Jersey City, N. J.

1,012,472. Gas Stove. J. Steinmassl, Corona, N. Y., assignor to himself and Albert Weinkauf, Jamaica, N. Y.

1,012,520. Gas Meter Registering Mechanism. W. D. Cheshire and E. D. Weipert, Birmingham, England, assignors to Parkinson and W. and B. Cowan, Limited, same place.

Items of Interest
FROM VARIOUS LOCALITIES.

THE Hunterdon (N. J.) Gas Company has applied to the Public Utilities Commission of the State for the right to issue bonds, the proceeds of such issue to be applied to the consolidating of the Flemington and Lambertville Gas Companies.

JUST to show that gas is going serenely on its way in Syracuse, N. Y., it is mentioned that the output for a recent 24 hours was 2¼ millions cubic feet. It is easily within the memory of the writer that the late Mr. Austin C. Wood, who at the time (and long after) waxed enthusiastic over the fact that the output for a particular year by the Syracuse Gas Company had reached ½ million cubic feet.

SOME evenings ago "The Workingmen's Conpensation Act" formed the subject of an address by the Chief Claim Agent of the Boston Consolidated Gas Company (Mr. Ernest Barker), at the December dinner and session of the heads of Departments of the Company. The speech brought out an animated discussion. The attendance numbered 50, and the session's room was in the Parker House.

THE lighting industry in general, and the residents of the thriving Massachusetts settlements of Leominster, Lunenburg and Whalom, Mass., will be well-concerned with a late ruling by the State Board of Gas and Electric Light Commissioners, which has to do with the furnishing of power to a Mr. Carswell, by the Leominster Electric Light and Power Company, for several labor-saving devices operated by him in the settlement of Resthaven, Whalom. This is the story of the affair, as reported in a recent issue of the Fitchburg (Mass.) *Sentinel:* "Mr. Carswell has an electric motor at Resthaven, Whalom, which is used to pump water. He desired to add several other labor saving devices to the institution and wanted power enough to operate them. He did not need an entire horse power for the purpose, but claiming that the Leominster Company refused to furnish power unless he installed a 1-horse power motor. Electricity for power is furnished at about 5 cents net, while electricity for lighting purposes, which Mr. Carswell has been using, costs about 15 cents net. Aside from the desire for more power there was also an opportunity to get the power needed at a great reduction over the present price, so all the people of Whalom and Lunenburg were anxious to know whether or not the Company would furnish the power. Mr. Carswell offered to pay the minimum charge of $1 per month for power, even if he didn't use that much, but he claimed the Company positively refused to consider his application. He had several telephone talks with the officials of the Company, and also put his requests and applications for power at other than lighting rates, but failed to receive any written reply, having to be content with telephoning messages that, 'There was nothing doing,' despite his willingness to pay the minimum charge. The matter appealed to the Lunenburg people so strongly that Mr. Carswell went to Boston and outlined his case to the Commissioners. Having promised to look into the matter, after due consideration, Mr. Carswell was thus informed: 'According to our latest advice from the Leominster Electric Light and Power Company, they assure us, if you will make application for a supply for 3 motors whose total capacity will exceed 1-horse power, they will be pleased to furnish you with the current.' This was signed by F. E. Barker, Chairman of the Board. Mr. Carswell immediately sent in his application to the Leominster Company and was informed that the power meter would be installed at once. The Company officials told Mr. Carswell that there was a misunderstanding in the matter and had a representative call on him. The affair was gone over and threshed out so that everybody was satisfied. Mr. Carswell gets his power at the minimum charge for 1-horse power whether he uses that amount or not. That was his original contention and it was sustained by the Board."

MESSRS. GEORGE W. BECK, Geo. Parkman and J. Fred. Schaffner have applied to the Governor of Pennsylvania for a charter for the right to supply gas "for illuminating purposes only," in the Boroughs of Montgomery and Muncy and the townships of Brady, Clinton, Muncy and Muncy Creek, all in Lycoming County, Pa. The hearing on the application will take place the 5th prox.

THE proprietors of the Utica (N. Y.) Gas and Electric Company have announced that, beginning with the 1st inst., the selling rate for gas is to rule at $1.30 gross, and $1.20 net. The former rate was $1.40 and $1.30.

"R. M. R.," writing from Northumberland, Pa., under date of the 22d November, says: Another reorganization of the Northumberland

Gas Company was held in Sunbury last week. Harmony marked the proceedings, and men of responsibility were elected to carry out directions for a new stock issue, the proceeds of same to be availed of for making extensive plant improvements. The following gentlemen were named to supervise its affairs: President, T. H. Hutchinson; Treasurer, Edmund Van Alen; Secretary, J. H. Mailey; Directors, J. H. Lunker, H. C. Taggart and W. W. Hepburn.

MR. L. E. GORHAM, Manager of the Geneseo (Ills.) Light and Gas Company, has leased new office quarters for the concern; which, since the 1st inst. has been comfortably ensconced therein, and where the Company will remain for a period of 5 years. The quarters are right in the heart of the city, being in the Seibel Building just north of the Farmers' National Bank premises.

MR. F. W. BOWEN, formerly of Chicago, has been appointed General Manager of the City Gas and Electric Company, of Paris, Ills.

THE special election, to pass upon the acceptability to the voters of Battle Creek, Mich., of the new franchise recently granted by the Council to the Battle Creek Gas Company, has been set for the 6th prox. It is worthy of note, perhaps, to say that property-owning women are entitled to vote on the proposition.

THE Brockton (Mass.) Gas Light Company has petitioned the authorities for permission to extend its mains to the outlying settlement of Bridgewater.

A VERY much surprised man in Kalamazoo, Mich , was Mr. J. B. Evans, a foreman on the working staff of the General Gas Light Company, when, on an evening not long ago, the quietude of his home on Pitcher street was unannouncedly disturbed by the appearance therein of many of the men who are under his supervision. They carried with them a handsomely upholstered cozy rocker, which seemed to appeal to Mrs. Evans with much force, in that, while refreshments were being served, she remarked that, "Now, more than ever, will Mr. Evans remain at home." Meaning ——?

"DEAR JOURNAL: 'Tis a pity you weren't with us on the occasion of the annual dinner of our Fitchburg Citizens' Company's employees, which was brought off in Alpha Hall. Many of the Company's 'high men' were in attendance, and dancing was preceded by an entertainment in which the sweet singers were 'Andy' Dinnegan and 'Dan' Delorey. George Ellard had charge of the floor.—V.M."

A CORRESPONDENT in East Braintree, Mass., under date of the 23d inst., forwarded the following: "Late last week in the presence of the officials of the city, the officers of the corporation and guests of both, the new $500,000 gas plant of the Old Colony Gas Company, which was built to supply gas for lighting, cooking and power purposes to the residents of Quincy, East Braintree, Braintree, Weymouth, Abington, Whitman and Rockland, was started. Hearty cheers were given when President E. N. Farnsworth twirled the valve which started the gas on its 52 mile journey. Subsequently an elaborate dinner was served in the local hotel. The chief speaker of the evening was Mr. Alfred W. Donavan, President of the Massachusetts Board of Trade, in which he called attention to the fact that better illumination would so improve the towns which are supplied by the Company, that other and greater strides would be taken by the residents in bettering other local conditions. Mr. C. G. Goeltz, the engineer under whose direction the plant was built, was the particular guest of the evening.

MR. CHARLES S. MORGAN, for some years Commercial Representative of the Peoples Gas Light Company, of Manchester, N. H., has been appointed Commercial Manager of the Plattsburgh (N. Y.) Gas and Electric Company. He takes charge at Plattsburgh to-day.

THE case of the Cedar Rapids (Ia.) Gas Company *vs.* the local authorities, which our readers will likely remember is connected with an arbitrary gas rate by the city, and which is now on the calendar of the U. S. Supreme Court, will be argued early next month.

PRESIDENT R. R. DICKEY, of the Dayton (O.) Gas Company, and associates, have arranged for the construction of a handsome office structure on the site owned by the Company at First and Sinclair streets. The architects are Messrs. Schenck and Williams.

THE proprietors of the North Adams (Mass.) Gas Light Company have purchased, from the Arnold Print Works, that section of its property resting on the East side of Brown street, which section adjoins the property of the Gas Company on the West side. The plot is noteworthy in that it was from this point the first international collegiate balloon race was started.

"M. M. W.," writing from Richmond, Va., this week, says: "The Virginia Supreme Court has upheld the validity of the Richmond ordinance ordering that an unpaid gas bill is a lien on the property until paid by the *owner* thereof. The opinion was handed down in connection with the case of P. H. Mayo *vs.* Joseph M. Shelton, in which an appeal from the Chancery Court of Richmond was prayed and refused. In May, 1905, the plaintiff (Mayo) rented a store on East Main street to a certain tenant, who obligated himself under a 3-year leasing term. He in turn sublet the property to one A. B. Bruce, who conducted a restaurant there. In October, 1910, Mr. Mayo, who had leased the store to another tenant, learned that the gas had been turned off, and found that Bruce had failed to pay a gas bill of $66.67, which sum would have to be paid before the gas would be again turned on. Mayo decided to test the legality or validity of the law, claiming that the charter granted no power to the city to make the owner of property responsible for the gas bills of his tenants. The Supreme Court, however, as remarked above, finds the ordinance is legal and that the claim is binding."

MR. WILLIAM BRADFORD, of the electrical staff of the Laclede Gas Light Company, of St. Louis, recently delivered a very interesting story before the St. Louis League of Electrical Interests, concerning the new electric plant of the Company completed not long ago on the premises at Mound street and the Levee. The story was told in the City Club's rooms.

"F. B.," writing from Boston, Mass., under date of the 23d inst., inclosed this: "The Massachusetts Board of Gas and Electric Light Commissioners last week handed down its finding in the instance of the appeal of the Clinton Gas Light Company from the provisions of the franchise granted to the Connecticut River Transmission Company by the Clinton Board of Selectmen in 1909. The hearings on the appeal were held in Clinton last July. In the matter of limiting the franchise to 28 years, the Commission cut out that provision completely, making the franchise rights a perpetuity, giving the town no right to change at the end of a specific period. The Town Council sought to preserve competition to 2 methods; compelling the Company to furnish power to small consumers in this, that the fact that an applicant for power was but a small user must not be used as an excuse by the Company for not furnishing power, and further that the Transmission Company could not sell power to the Clinton Gas Light Company. Both of these restrictions were overruled, the State Board in its finding deciding that the Transmission Company may sell power at will to the Gas Company and may not furnish power to any consumer requiring less than 300 horse power. It is provided that the Transmission Company must furnish power to the town if at any future time the town wants electricity for municipal purposes, such as street lighting. The Board further declares that it reserves the right to make changes in the restrictions and grants in the future if it deems it necessary.

WORK on the extension of the New Haven (Conn.) Company's main system from the Mount Carmel Station, north, is well underway, if not finished in fact. Roughly stated, it may be said that the Company has established a continuous line from the Housatonic river to Mount Carmel, a length of 28 miles.

MR. JOHN F. SHANLEY, of the well-known contracting firm of B. M. and J. F. Shanley, of Newark, N. J., died at his home in Newark, the morning of December 18th, after a brief illness. Deceased was born in Newark, June 1, 1855, and was the son of Michael Shanley, who in his time and day was one of the best-known railroad builders in New Jersey. He graduated from Seton Hall College, New Jersey, in the Class of 1873, and at once entered the firm of M. Shanley & Sons, during which partnership they constructed the Third Avenue Railroad structure in this city; on the death of his father the firm of B. M. & J. F. Shanley was formed, and that concern's operations were on a scale to cause them to obtain a world-wide reputation. He was for a time President of the Essex & Hudson (N. J.) Gas Company, which combination was partly formed through his efforts, and he had other interests that were closely identified with artificial lighting enterprises. Of him it may be truthfully written that no other man lived in New Jersey whose charities were more liberal, or were bestowed with less ostentation. His survivors are his widow, a son and 4 daughters.

THE Wall (N. J.) township authorities have assented to the petition of the proprietors of the Coast Gas Company, to run gas mains through Allenwood and Allaire, thence to the Ocean county line, thus hooking up Belmar and Lakewood in sensible alignment.

THE Manitowoc (Wis.) Company will pipe gas to Two Rivers, which gas will be distributed there by the local authorities through a distributing system owned and operated altogether on municipal account.

WE are informed that the employees of the Utah Coke and Gas Company, Salt Lake City, Utah, have formed an organization for the purpose of advancing themselves in the ways and means of carrying on their avocations. It is to be controlled by a Board of Governors, a series of lectures is proposed for January and February, and it will seek affiliation with the National Commercial Gas Association.

AGAIN are the plumbers of Washington, D. C., up in arms to make loud protest against the action of the Washington Gas Light Company, in installing and operating an up to-date gas appliance sales and showroom.

THE feature of the week in Fitchburg, Mass. (that is, Christmas week), was the Christmas Tree festival and banquet enjoyed by the officials and employees at the instance of the Fitchburg Gas and Electric Club. About 100 shared in the festivities.

The Market for Gas Securities.

The closing quotations for city gas shares during the year show no particular change as against those reported for the opening. To-day (Friday) Consolidated was 138¾ to 139; a year ago, the figures were 136¾ to 137. This return is a queer one, for in the twelvemonth the Company has increased its annual dividend return, its physical condition has improved full 25 per cent., and its standing as to output is relatively much firmer. However, the fly in the ointment is undoubtedly the shadow of the labor strike, which fly is positively a weakling; for while not 5 per cent. of its employees have been organized under the Wyatt *et al.* coteries' proceedings, it is a sure thing that, from the general point of view of the taxpaying people of the city, the law will promptly see to it that such a vital matter to the people as their artificial lighting supply surely is, shall in no sense be tampered with.

The change in Brooklyn Union (the dividend rate on which has also been increased) for the year is only 4 points; that is, to-day it is 157 to 142; in 1910, it was 134 to 136. Outside securities are as a rule at the figures quoted at the close of 1910.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

115 BROADWAY, NEW YORK CITY.

JANUARY 1.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked*
Consolidated Gas Co.	$78,177,000	100	138¾	139
Central Union Gas Co.—				
1st 5's, due 1927, J. & J.	8,000,000	1,000	103	105
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	105	106
Mutual Gas Co.	3,600,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	35	50
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	98¼	100½
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	103	105
Con. 5's, due 1945, J. & J.	1,500,000	—	95	100
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	60	70
Preferred	5,000,000	100	90	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	103	105
The Brooklyn Union	15,000,000	1,000	137	142
1st Con. 5's, due 1948, M. & N.	15,000,000	—	106¾	107
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	⅛	¾
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	—
" 1st Mtg. 5's	500,000	1,000	97	100
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	59	60
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	20,500,000	100	87	90
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90¼	91
Preferred	3,026,500	100	75¼	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	13,460,084	—		—
Mortgages, 5's	3,400,000	—		—
General Mortgage 4½	10,661,000	—		—
Con. Gas Co., Baltimore City, 4½	2,751,000	—		—
Consolidated Gas Co. of N. J.	1,000,000	100	15	—
Con. Mtg. 5's	976,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	3,500,000	—	102	105
Detroit City Gas Co.	6,580,000	—	—	50
" Prior Lien 5's	5,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	125	138
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,350,000	1,000	100	101
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	130	138
" Bonds, 5's	10,500,000	—	101	106
Indianapolis	2,000,000	—	—	38
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	86
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis	10,000,000	100	104½	105
Preferred	2,500,000	100	114	120
Bonds	10,000,000	1,000	102½	103
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	400,000	1,000	106	106¾
Massachusetts Gas Companies, of Boston	25,000,000	100	90	90¼
Preferred	25,000,000	100	95½	95⅝
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	97	98
Bonds, 6's	6,000,000	—	127	128
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	103	103½
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104¾	105¼
Pacific Gas and Electric Co.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	1,000,000	1,000	94	98
St. Paul Gas Light Co.	2,500,000	100	—	—
1st Mortgages, 6's	650,000	1,000	104	106
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	3,447,000	1,000	94	96
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	101	103
Washington (D. C.) Gas Co.	1,600,000	200	430	440
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	280	—

MEETING TIMES OF THE VARIOUS GAS ASSOCIATIONS.

American Gas Institute.—Annual meeting, October 16 to 18, 1912. Atlantic City, N. J. Officers: President, Ira C. Copley, Aurora, Ills. Secretary, Geo. G. Ramsdell, 29 West 39th st., N. Y. City.

Canadian Gas Association.—Annual meeting, ———— Officers President, Arthur Hewitt, Toronto, Ont.; Secretary and Treasurer, John Keillor, Hamilton, Ont.

Empire State Gas and Electric Association.— nnual meeting, New York City, Oct. 1912. Officers: President, R. M. Searle, Rochester, N, Y.; Secretary, C. H. B. Chapin, 29 W. 39th street. New York City.

Guild of Gas Managers of New England.—Annual meeting, March, 1912. Young's Hotel, Boston; monthly meeting, second Saturday. Officers: President, Walter G. Africa, Manchester, N. H.; Secretary, H. K. Morrison, Brockton, Mass.

Illinois Gas Association.—Annual meeting, time, March, 1912, Chicago, Ills. Officers: President, C. B. Strohn, Elgin, Ills.; Secretary-Treasurer, F. E. Newberry, Dixon, Ills.

Illuminating Engineering Society.—Annual meeting, Sept. ————1912, ———— Meetings of Sections, monthly. Pres't, A. E. Kennelly, Boston, Mass.; Secretary, Preston S. Millar, 29 W. 39th street, N. Y. City. Sections: New York, Secretary, Albert J. Marshall, 16 East 40th street. New England, Secretary, H. C. Jones, 10 High street, Boston, Mass. Philadelphia, Secretary, L. B. Eichengreen, Broad and Arch streets. Chicago, Secretary, A. L. Eustice, 105 North Wabash avenue.

Indiana Gas Association.—Annual meeting, Jan. 17 and 18, 1912, Indianapolis. Officers: President, S. E. Mulholland, Fort Wayne; Vice-President, Howard L. Olds, Indianapolis; Secretary-Treasurer, Philmer Eves, Indianapolis.

Iowa District Gas Association.—Annual meeting, time, May, ——, 1912; Lincoln, Neb. Officers: President, G. W. Clabaugh, Omaha, Neb.; Secretary and Treasurer, G. I. Vincent, Des Moines, Ia.

Kansas Gas, Water and Electric Light Association.—Annual meeting, time, Sept. 1912. Manhattan, Kas. Officers: President, B. F. Eyer, Manhattan, Kas.; Secretary and Treasurer, J. D. Nicholson, Newton, Kas.

Michigan Gas Association—Annual meeting, time, Sept. ————1912;———— Officers: President, F. W. Blowers, Kalamazoo, Mich; Secretary-Treasurer, Glenn R. Chamberlain, Grand Rapids, Mich.

Missouri Electric Light, Gas, Water Works and Street Railway Association.—Annual meeting, April, 1912; St. Louis, Mo. Officers: President, F. E. Murray, Louisiana, Mo.; Secretary and Treasurer, N. J. Cunningham, Springfield, Mo.

National Commercial Gas Association.—Annual meeting, December, 1912. Atlanta, Ga. Officers: President, C. L. Holman, St. Louis, Mo.; Secretary, Louis Stotz, 29 West 39th street, New York City.

Natural Gas Association.—Annual meeting, May, 1912, Kansas City, Mo.; Officers: President, A. B. Macbeth, Independence, Kas. Secretary, T. C. Jones, Delaware, O.

New England Gas Association.—Annual meeting, February, 14th and 15th, 1912 Boston. Officers: President, J. A. Coffin, Gloucester, Mass.; Secretary-Treasurer, N. W. Gifford, East Boston, Mass.

New Jersey State Gas Association.—President, William H. Pettes, Newark, N. J.; Secretary-Treasurer, Arthur H. Osborn, Belmar, N. J.

Ohio Gas Association.—Annual meeting, February 6 and 7, 1912, Columbus, O.; President, John M. Garard, Columbus, O.; Secretary-Treasurer, T. C. Jones, Delaware, O.

Oklahoma Gas, Electric and Railway Association.—President, Noel R. Gascho, Alva Okla.; Secretary, H. V. Bozell, Norman, Okla.

Pacific Coast Gas Association.—Annual meeting, Sept. ————1912, ———— ——Officers: President, W. Baurhyte, Los Angeles, Cal.; Vice-President, Henry E. Adams, Stockton, Cal.; Secretary-Treasurer, John A. Britton, 445 Sutter street, San Francisco, Cal.

Pennsylvania Gas Association.—Annual meeting, York, Pa., April 8-10, 1912, Officers, President, C. W. Butterworth, Philadelphia, Pa; Secretary-Treasurer, William H. Merritt Lebanon, Pa.

Society of Gas Lighting.—Annual meeting, Dec., 13, 1912; monthly meeting, second Thursday. Place, New York City. Officers: President, Fred. S. Benson; Secretary, George G. Ramsdell, 254 West 89th street, New York city.

Southern Gas Association.—Annual meeting, April, 1912, Jacksonville, Fla. Officers, President, H. B. Hoyt, Jacksonville, Fla.; Secretary-Treasurer, E. D. Brewer, Atlanta, Ga.

Southwestern Electrical and Gas Association.—Annual meeting. April 27, 28, 29, 1912; Houston, Tex. Officers: President, J. E. Carroll, Beaumont, Tex.; Secretary, D. G. Fisher, Dallas, Tex.

Wisconsin Gas Association.—Annual meeting, May 15 and 16, 1912, Milwaukee, Wis. Officers: President, H. M. Buck, Waukesha, Wis.; Secretary-Treasurer, Henry Harmon, Milwaukee, Wis.